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WEIL'S DISEASE IN THE NORTH-EAST OF SCOTLAND

AN ACCOUNT OF 104 CASES*

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During the past few years increasing attention has been paid to the clinical, bacteriological, and epidemiological aspects of Weil's disease, with the result that it has been found to be much more prevalent and more widely distributed than was originally anticipated.

In 1934 (Davidson *et al.*) we published a clinical and bacteriological study of fifteen cases of this disease, twelve of which occurred in fish workers in Aberdeen. We suggested that workers among fish must be included in the occupational groups especially liable to Weil's disease. In 1936 (Davidson and Smith) we described the clinical manifestations and the biochemical changes in the blood and urine of forty-one cases, forty of which occurred in fish workers. Our bacteriological investigations established the connexion between the carriers of the disease (infected rats) and the sufferers from the disease (infected fish workers) through contaminated water and slime in the fish-cleaning and curing establishments. Later in the same year we showed that 24.3 per cent. of samples of blood removed from 210 fish workers who were in normal health gave a positive sero-reaction in dilutions ranging from 1 in 30 to 1 in 1,000, while in a control series of tests carried out on 406 samples of blood removed from individuals not engaged in the fish trade no positive reactions were obtained. From our experience we suggested that Weil's disease occurs in Aberdeen in three grades: (1) where the infection is so mild that symptoms are insignificant or absent; (2) where infection is moderate and the symptomatology is influenzal in type with no apparent jaundice; (3) where the infection is severe, with the characteristic picture described below. In the same paper we submitted to the fish trade our suggestions for the prevention of Weil's disease, which included a joint organized campaign for the extermination of the rodents, the rendering of premises rat-proof, the maintenance of a higher standard of cleanliness, and the use of a hypochlorite solution known as "chloros," which we found to have a lethal effect on leptospirae in a dilution of 1 in 4,000 without producing any deleterious effects that might interfere with marketing arrangements.

In the present communication we wish to describe the clinical manifestations of 104 cases of Weil's disease that have occurred in the North-East of Scotland between 1934 and 1939, and to discuss some of the bacteriological and serological investigations which we have carried out.

Analysis of Cases of Weil's Disease in Great Britain

In the analysis given below cases are included only if the clinical diagnosis was adequately confirmed by bacteriological or serological tests. Previous to 1922 proof of the occurrence of Weil's disease in Great Britain had never been obtained. In that year Manson-Bahr *et al.* (1922) isolated *L. icterohaemorrhagiae* from the blood of a seaman who, four days previously, had fallen into the Thames. In 1924 Gulland and Buchanan described an outbreak of epidemic jaundice among miners in East Lothian. Later Buchanan (1927) reported the clinical and bacteriological findings in twenty-two cases of Weil's disease. Alston and Brown (1937) reviewed the literature and stated that between July, 1933, and February, 1937, 142 cases with twenty-two deaths had been reported in various parts of Great Britain. The majority of cases had occurred in individuals employed as fish workers (forty-six), coal miners (thirty-four), and sewer workers (nineteen). More recently cases have been reported by Murgatroyd (1937) in a farm worker, by Stuart (1938, 1939) in tripe workers and sewer workers in Glasgow, by Robertson (1938) in individuals bathing in a stream in Hampshire, and finally by Rees (1939) and Sladden (1939) in miners in South Wales. The total number of cases in Great Britain in which the clinical diagnosis has received adequate bacteriological confirmation is therefore 185. To that number must now be added another sixty-three cases described in this communication for the first time. The grand total is accordingly 248, of which 109 have occurred in fish workers. Since the incidence of leptospiral infection in rats in Aberdeen (27.3 per cent.) is no higher than that found elsewhere in Great Britain, the large number of cases among fish workers and the frequency with which immune bodies can be demonstrated in the blood of healthy workers in the fish trade (24 per cent.) justify the conclusion that the risk of contracting infection is greater in that trade than in any other in this country.

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Occupational Incidence and Geographical Distribution of Cases in Aberdeen

Of 104 cases reported in this paper ninety-eight occurred in fish workers (filleters, curers, porters, and carters). The remaining six were in farm workers (two), labourers constructing sewers (two), and an engineer in a rag factory, and one arose from harbour immersion. One case occurred in Aberdeenshire and three in Kincardineshire, the remainder arising in the city of Aberdeen. A study of the streets in which the one hundred patients were employed showed that ninety-seven worked in a small area adjacent to the harbour and the fish market.

An investigation into the distribution of the ninety-seven cases in relation to the numerous fish-curing yards in Aberdeen showed that infection had been contracted in no fewer than fifty-three different establishments. In each of thirty-six yards only one case had occurred, whereas in four yards six to eight individuals developed the disease. Further investigation revealed the fact that the number of workers in the yards with six to eight cases was, on the average, six to eight times greater than the number employed in the establishments in which one case had developed. It may be presumed, therefore, that the variation in the incidence of the disease in the different yards is at least largely explicable on the basis of the number of workers exposed to infection. It is worth noting that one firm with a large number of employees has never had a case of Weil's disease during the past five years. Accordingly we investigated the working conditions, and found that the type of work undertaken was almost entirely connected with the salt fish trade, in contrast to all the other establishments where Weil's disease has occurred, which specialize in the fresh fish trade.

Yearly and Monthly Distribution of Cases

The number of cases of Weil's disease which have occurred annually in Aberdeen during the past five years has been fairly constant. In 1934 there were twenty-four cases, in 1935 and 1936 seventeen cases, in 1937 twenty cases, and in 1938 twenty-six cases. It is clear that the advice we offered to the trade in 1934 in regard to preventive measures has never been utilized.

An analysis of the monthly distribution of cases in each of the five years suggests that Weil's disease occurs least often in February and March (a total of four cases in five years) and most often in August and September (thirty-one cases in five years). If the year is divided into two halves it is found that seventy-one cases occurred between July and January and thirty-three between February and June. Since the fish trade operates at approximately the same degree of activity all the year round it must be assumed that variations in the seasonal distribution of cases depend either on an increased or decreased viability of the leptospirae to seasonal variations of environmental temperature or on changes in the habits of the rats at different seasons of the year.

Age and Sex Incidence

Table I gives the age and sex incidence of 104 cases of Weil's disease occurring in the North-East of Scotland. There were fifty cases in males and fifty-four in females. The total number of males employed in the industry is 786 and the number of females 1,277. It will be noted that nearly half the cases occurred before the age of 20 and that four-fifths of these patients were females. This finding is related to the working conditions of the fish trade, in which young girls between the ages of 15 and 20 carry out the procedures of cleaning, gutting, and filleting fish. Between 80 and 90 per cent. of the workers below the age of 20 are females, whereas after the age of 30 the majority of the employees are males engaged as foremen, porters, carters, etc.

TABLE I.—*Age and Sex Incidence of Cases*

Age Group	Sex	Cases	Deaths
14–20	M	9	0
	F	40	0
21–30	M	18	1
	F	10	0
31–40	M	8	0
	F	3	0
41–50	M	7	1
	F	0	0
51+	M	8	4
	F	1	0
Total		104	6

Mortality Rates

Table II gives the death rate from Weil's disease in the 104 cases in the North-East of Scotland. The figure of 5.7 per cent. is a little over one-half of that obtaining in Holland. We ascribe the low death rate to the high incidence of healthy young girls in the trade. It will be noted that there were no deaths among the fifty-four females. The effect of advancing years in increasing the dangers of the disease is well brought out by the four deaths among the nine patients over 50 years of age. The same tendency is noted in regard to morbidity. In general, middle-aged and elderly patients were more seriously ill than young ones. The liver in such patients seems to be peculiarly susceptible to the toxaemia of Weil's disease, and if in addition there is a history of an alcoholic tendency the prognosis becomes correspondingly more serious. At least two of our fatal cases gave a history suggestive of having partaken of excessive spirits over a long period.

TABLE II.—*Analysis of Deaths*

	Cases	Deaths	Mortality per Cent.
Total	104	6	5.7
Male	50	6	12.0
Female	54	0	0.0
Under 50 years.. ..	95	2	2.1
Over 50 years	9	4	44.4

Clinical Manifestations

GENERAL

These will only be described briefly, as a full description of the symptoms and signs will be found in our previous publications.

The course of the disease may be divided into three stages. The first or febrile stage lasts approximately one week, and during this time septicaemia occurs, antibodies are not detectable in the blood, and spirochaetes are not found in the urine. The patient is suddenly taken ill and complains chiefly of headache, vomiting, and severe muscular pains all over the body. In severe cases there is marked prostration, and the temperature rapidly rises to 102–104° F. Table III gives the percentage incidence of the various symptoms and signs in the 104 cases. Since jaundice rarely appears before the fifth day of the illness a diagnosis of influenza is usually made. The

TABLE III.—*Percentage Incidence of Clinical Manifestations in 104 Cases*

Symptoms	Present in	Percentage
Sudden onset	104	100
Initial chill	71	68
Fever	103	99
Headache	91	87
Muscular pains	103	99
Prostration	46	44
Vomiting	84	80
Cough	18	17
Pharyngitis	34	32
Conjunctivitis	83	79
Icterus	68	65
Haemorrhages: mild	61	58
,, severe	19	18
Enlarged liver	28	26
Palpable spleen	1	0.9
Adenopathy	13	12
Meningitis	10	9

presence of a marked conjunctivitis (pink-eye) and the evidence of a toxic nephritis (albumin, cells, and casts) may be helpful in suggesting the correct diagnosis, particularly if the patient is employed in an occupation in which the hazard of leptospiral jaundice is high.

The second or toxic stage is characterized by the absence of spirochaetes and the development of antibodies in the blood and the excretion of organisms in the urine. If jaundice has not appeared by the beginning of the second week the case may be considered to be mild; the symptoms then rapidly abate. In moderately severe cases which are going to do well the fever abates and the clinical condition improves; but the jaundice continues for another week or two, and the signs of a toxic nephritis are present for at least a month. In cases doing badly the jaundice becomes intense, the urinary output falls, the blood urea rises rapidly, purpura into the skin and from the mucous membranes occurs, and a falling blood pressure and steadily mounting pulse indicate the gravity of the situation.

The third or convalescent stage is characterized by the development of antibodies in the blood and by the excretion of organisms in the urine. The distressing symptoms gradually subside, but convalescence is greatly prolonged in those who have been seriously ill. An interesting second rise in temperature occurs during the third week of the illness in approximately half the cases.

SPECIAL

(*a*) *Blood Examination.*—Red and white cell counts and haemoglobin estimations were carried out in a series of cases. The leucocyte count varied, according to the severity of the disease and the individual's response to the infection, from 10,000 to 30,000 leucocytes per c.mm. of blood. The increase was essentially due to an excess of neutrophil polymorphonuclear leucocytes, and a typical shift to the left was noted. The red cell count and haemoglobin were consistently reduced in all cases in which toxaemia was severe, and particularly if purpura was a prominent symptom. In such cases an erythrocyte count of 2,500,000 to 3,500,000 with a haemoglobin concentration of 40 to 60 per cent. was not uncommon. In one case with severe purpura the erythrocytes fell to 1,400,000 and the haemoglobin to 26 per cent., and a transfusion of blood had to be given.

(*b*) *Biochemical Estimations.*—The icteric index was estimated in eighty-three cases. In 80 per cent. a figure of 10 units or higher was found. Figures for the blood urea are available in eighty-two cases. In 60 per cent. a figure of 40 mg. per 100 c.cm. or over was found. Of the six fatal cases one patient died with anuria shortly after admission to hospital, and no figures are available for either the blood urea or the icteric index. Four died with the blood urea greatly increased—namely, 161, 250, 300, and 397 mg. per 100 c.cm. In the sixth case the blood urea was only 89 mg. per 100 c.cm., but this estimation was made on a sample of blood removed on the fourth day of the illness. The patient died at home on the eighth day after the onset, without being admitted to hospital. It is obvious, therefore, that a high blood urea is a sign of serious prognostic importance. Nevertheless it must be remembered that recovery can occur despite a greatly increased blood urea. Thus we have had seven patients recover whose blood urea was respectively 128, 128, 143, 152, 161, 202, and 300 mg. per 100 c.cm. With regard to the icteric index in the fatal cases, the figures were 60, 63, 67, 89, and 150. In contrast, in patients who have recovered we have obtained figures of 100, 166, and 187. In the six fatal cases death occurred between the eighth and tenth days of the illness, by which time the maximum degree of jaundice may not have developed.

(*c*) *Meningitis.*—In ten cases the symptoms and signs were strongly suggestive of meningitis. The clinical diagnosis was confirmed in each case by examination of the cerebrospinal fluid. The protein content was raised in most instances, but the figure varied between 25 and 80 mg. per 100 c.cm., the average being 54 mg. The number of cells per cubic millimetre of cerebrospinal fluid was also increased. It varied between 30 and 243, the average being 125. The increase in cells was proportionately greater than the increase in protein. Differential counts showed that in the early stages the increase in cells was due to an excess of neutrophil polymorphonuclear leucocytes. Later this was replaced by a lymphocytosis. The cerebrospinal fluid was tested for the presence of immune bodies, and in six cases a positive result was obtained. The titre at which the cerebrospinal fluid agglutinated the leptospirae was low in five cases—1 in 2 (three cases), 1 in 6 (one case), 1 in 30 (one case)—while in the sixth a figure of 1 in 300 was obtained. The cerebrospinal fluid was injected into guinea-pigs, but in no instance were leptospirae recovered. Although the ten patients with Weil's disease complicated by meningitis were severely ill, complete recovery occurred in each case.

Treatment

(*a*) *Symptomatic.*—Treatment on the general lines suitable for any severe febrile disease is required. This includes rest, good nursing, tepid sponging, and the use of diaphoretic, analgesic, and hypnotic drugs. A simple alkaline mixture containing potassium citrate, sodium bicarbonate, and liq. ammon. acetatis is worthy of trial for combating the gastritis and facilitating the urinary excretion. The diet should be low in fats and protein and rich in carbohydrate, since hepatic and renal damage is present. Plenty of fluids and fruit juice, sweetened with glucose, should be given frequently. Iron in full doses will be required to correct the hypochromic anaemia which so often develops.

(*b*) *Specific.*—Ample evidence has been accumulated in Holland and elsewhere in regard to the value of anti-leptospiral serum. A reduction both in the mortality of the disease and in the severity of the toxaemia has been shown to result, particularly if the serum is given early—that is, within the first four days. After the seventh day, when the septicaemic stage is over, the beneficial effects are much less marked. The amount of serum advocated is 10 to 20 c.cm., given intramuscularly or intravenously, the dose to be repeated in four to six hours as required.

Bacteriological Findings in Weil's Disease

The final diagnosis of Weil's disease is largely dependent on the recovery of leptospirae from the patient or on the demonstration of immune bodies in the serum when convalescence is being established. In this investigation culture of the blood for leptospirae has not been extensively employed. When specimens of clotted blood were sent for examination the serum was removed for serologic and biochemical examination, and the clot was then injected intraperitoneally into two young guinea-pigs. Table IV shows the results obtained when the first specimen of blood received from each of eighty patients

TABLE IV.—*Blood: Bacteriological Findings in 80 Cases (Presence of leptospirae as shown by guinea-pig inoculation)*

	Day of Disease										
	1	2	3	4	5	6	7	8	9	10	11+
No. +	0	2	3	11	3	8	1	1	0	0	0
No. —	0	0	0	0	6	15	14	10	1	1	4
% +	—	100	100	100	33	35	7	10	0	0	0

was injected into guinea-pigs. Thus, up to the fourth day after the onset of illness the leptospira could be recovered from all cases. After that day the chance of recovering the organism rapidly decreased until on the seventh and eighth days it was found in the blood of exceptional cases only. These results are in accord with those reported by Japanese workers.

As regards the serological test, the findings are given in Table V. In no case was a positive serum reaction

TABLE V.—*Serological Tests on Serum*

	Day of Disease										
	1	2	3	4	5	6	7	8	9	10	11+
No. negative 1/10 dilution	—	2	3	9	5	9	3	2	0	1	0
No. positive 1/10 dilution or greater	—	—	—	1	5	16	19	23	8	11	62
% positive 1/10 dilution or greater	0	0	0	10	50	64	86	92	100	91	100
Positive reactions: Dilution of serum											
1/10	—	—	—	—	—	3	3	—	—	—	—
1/30	—	—	—	1	4	3	3	1	—	—	—
1/100	—	—	—	—	1	5	4	2	1	—	3
1/300	—	—	—	—	—	4	5	5	3	1	8
1/1,000	—	—	—	—	—	—	3	13	2	5	8
1/3,000	—	—	—	—	—	1	—	2	2	1	5
1/10,000 ..	—	—	—	—	—	—	—	—	—	3	12
1/30,000 ..	—	—	—	—	—	—	1	—	—	1	26

obtained before the third day after the onset. Thereafter the immune bodies rapidly increased in the serum until on the fifth day 50 per cent., and by the ninth day 100 per cent., of cases had given a positive reaction. Furthermore, the actual titre of the serum also increased from 1 in 10 in the early stages to 1 in 10,000 or 1 in 30,000 or more by the tenth day. In only three cases were leptospirae isolated from the blood at a time when immune bodies could be demonstrated simultaneously in the serum. In Case 37 the blood taken on the sixth day showed the presence of leptospirae and a positive serum reaction of 1 in 30; in Case 72 the specimen was collected on the fourth day and gave a positive result on guinea-pig inoculation and an agglutination reaction of 1 in 30; and finally in Case 81 the blood showed leptospirae on the seventh day and a weak serum reaction of 1 in 10.

Again, in four cases—Nos. 15, 41, 54, and 87—the first examination of the blood carried out between the fifth and the eighth day of illness showed a negative guinea-pig inoculation test and a negative serum reaction. It is therefore necessary to keep in mind the possibility that bacteriological and serological investigations undertaken in suspected cases of Weil's disease within eight days of the onset may give negative results, and accordingly further specimens of blood may be required before the diagnosis can be finally settled.

The leptospira can also be recovered from the urine, but it is essential that the specimen must be inoculated into guinea-pigs as soon as possible after being passed. Two hundred and eleven specimens of urine from eighty-eight cases of proved Weil's disease were tested by this method. In no instance has it been possible to recover the leptospira from specimens collected within the first seven days of the disease. In the period eight to fourteen days after the onset 19.3 per cent. of samples were positive, in the period fifteen to twenty-one days 21.5 per cent., and in the period twenty-two to twenty-eight days 9.5 per cent. Thereafter the results were negative. It would appear, therefore, that at no time during the course of the illness can virulent leptospirae be recovered with certainty from the urine.

Agglutinins may also be demonstrated for *L. icterohaemorrhagiae* in the urine of patients convalescing from the disease. This is probably due to the fact that albuminuria is a constant feature of the disease, and the immune bodies are excreted in a dilute form attached to the euglobin. A series of 100 observations have been made in fifty-two proved cases of Weil's disease, and the results are recorded in Table VI. In the first week of the illness three out of eighteen (16.6 per cent.), in the second week twenty out of twenty-eight (71.4 per cent.), in the third week thirty-four out of thirty-seven (91.8 per cent.), and

TABLE VI.—*Serological Examination of Urine Specimens*

Dilution of Urine	Day of Illness			
	1–7	8–14	15–21	22+
Negative 1/2	15	8	3	—
Positive 1/2	2	5	11	—
„ 1/6	—	1	2	2
„ 1/10	1	4	7	5
„ 1/30	—	6	6	4
„ 1/100	—	3	7	6
„ 1/300	—	1	1	—
Total + ...	3	20	34	17
% + ...	16.6	71.4	91.8	100

after the third week seventeen out of seventeen (100 per cent.) gave positive reactions in dilutions of 1 in 2 or greater. The highest urinary titre recorded during convalescence was 1 in 300.

Summary

The clinical manifestations of 104 cases of Weil's disease occurring between 1934 and 1939 are described.

In the paper are discussed some of the bacteriological and serological investigations carried out.

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THE ANTIRACHITIC VALUE OF HUMAN MILK

BY

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It is a surprising fact that the extensive literature on vitamin D does not contain precise information giving the range of antirachitic potency of human milk. It is a matter of particular importance when the character of the diet consumed by a large proportion of the people in this country is borne in mind. Our knowledge regarding the assimilation of bone-forming elements in the diet of mammalian species has been largely built up on the results of experiments on animals ; these have taught us how great an importance is to be attached not only to vitamin D but to the total daily intakes of calcium and of phosphorus in one form or another, as well as the ratio (Ca/P) between these intakes. An admirable summary of the existing information regarding the significance of the level of intake of these mineral elements has recently been provided by Shohl (1938), but, broadly speaking, it can be said that, at any rate one level of Ca *or* P intake—assimilation—in the absence of supplementary factors such as members of the vitamin D group, is most satisfactory within a certain and rather narrow range of values for the Ca/P ratio. Moreover, at any one Ca/P ratio the assimilation tends to improve as the total intake of the two components rises. Finally, it should be noted that the administration of vitamin D at any level of intake or Ca/P ratio improves the deposition of bone mineral, but, in general, its influence is most pronounced when the former is low and when values of the ratio are outside the desirable range.

In days when fish-liver oils, antirachitic concentrates, and even the pure vitamins of the D group are so readily available, it is easy to forget that until the introduction in England in the late eighteenth century of cod-liver oil for the treatment of bone affections the ordinary person had no such means of protection against rickets. Accustomed as we are to-day to think in terms of doses of hundreds and thousands of international units of vitamin D, the amounts supplied by ordinary foods must strike us as curiously insignificant (milk 0.5 to 4, butter 20 to 100, egg yolk 150 to 500, liver 10 to 50 I.U. per 100 grammes) (Fixsen and Roscoe, 1937–8). What, then, was the position in England before the virtues of cod-liver oil were recognized? In a recent publication Drummond and Wilbraham (1939) examined this question in some detail, with the result, it is thought, that evidence has been obtained to show that the striking outburst of rickets which appears to have occurred in Southern England and Ireland towards the end of Tudor times, and which attracted great interest, was due primarily to a sharp fall in the consumption of dairy produce. It is there suggested that the outbreak of the disease was more related to a decreased intake of calcium in many diets than to a reduction in the amount of natural vitamin D, although doubtless both played a part.

Calcium Requirements

The remarkable facts revealed by the discovery of vitamin D and the investigation of its role have tended to direct attention rather unduly, so far as the study of human rickets is concerned, from the significance of the intake of bone-forming elements. The surveys of Sir John Orr (1936) and of others have given convincing proof how large a proportion of our population to-day are living on diets which fail to supply the estimated physiological requirement for calcium. These diets are in striking contrast to those of the relatively poor Englishman of centuries ago, when, thanks to wholemeal breads and large consumption of milk and cheese, the daily intake of calcium was often as much as four to six times that of the poor to-day. Seventeenth century diets of simple folk—for example, sailors or the patients of St. Bartholomew's Hospital—provided no less than 2 grammes of calcium a day, and, let it be noted, the Ca/P ratios were often excellent. It is not unreasonable to think that the human requirement for vitamin D would probably be at its minimum under such conditions. They are rarely found to-day. Hundreds of thousands of the poorer sections of the community are living at the present time on diets supplying from 0.2 to 0.5 gramme of calcium daily—intakes which are all too often associated with relatively high intakes of phosphorus, giving ratios of below 0.5 and not infrequently as low as 0.2.

Experiments have already clearly demonstrated the beneficial effect of supplementing diets of this character with additional calcium, thereby not only raising the total intake of bone-forming salts but also bringing the figure for the Ca/P ratio nearer the optimum range of 1 to 2. The improvement particularly affected the bony structures, and in this connexion it is important to remember that no additional vitamin D was supplied (Coward *et al.*, 1938 ; Gaunt *et al.*, 1938).

Factors leading to Rickets

The surprisingly small amount of vitamin D in cows' milk (17 to 26 I.U. per quart in summer and a mere 5 to 8 I.U. per quart in winter) and the discovery of the fact that the higher values in summer are due not to a change of diet but to the direct effect of exposure to sunshine and skyshine (Campion *et al.*, 1937) raised the very important question whether the smaller incidence of

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rickets among breast-fed infants, as compared with those reared on cows' milk, is to be ascribed to a more efficient utilization of the bone-forming salts, to a richer content of antirachitic vitamin in mothers' milk, or perhaps to both factors.

The literature on the antirachitic value of human milk is unsatisfactory. Hess and Weinstock (1927) found that 25 to 30 ml. of human milk was required to prevent rickets developing in rats fed on a rachitogenic diet, whereas 20 to 25 ml. of cows' milk was effective. The results of this investigation, and of similar experiments subsequently reported by other workers, are misleading because striking improvements in the condition of the bones of animals fed on certain types of rachitogenic diets can be brought about merely by improving the Ca/P ratio. The apparent superiority of cows' milk as an antirachitic agent revealed by such experiments could be ascribed more correctly to its higher content of these elements than to any greater concentration of vitamin D.

In order to assay the vitamin D content of milks it is advisable to separate the fat and administer it to the animals fed on a rachitogenic diet. Few investigators have troubled to do this, and none, so far as we are aware, has attempted to make assays of the vitamin D content of human milk-fat by the modern method of evaluation against the approved international standard of vitamin D. The specimens examined by us were not entirely satisfactory in that they were for the most part random samples collected during the first two months of pregnancy from patients attending the infant welfare department of University College Hospital. Unfortunately, it was not practicable to obtain samples fully representative of the twenty-four-hours yield. On receipt of the specimens in the laboratory sufficient was retained for the calcium and phosphorus analyses (see later), the remainder being treated with alcohol and a mixture of ether and light petrol in order to separate the fat. The isolated fat was administered in carefully measured doses to groups of rats in which rickets had been produced by a rachitogenic diet. The degree of rickets at the beginning of the experiment and after ten days' dosage with the milk fats was assessed by *x*-ray examinations of the leg bones.

TABLE I.—*Analyses of Human Milks for Vitamin D, Calcium, and Phosphorus*

No.	Month of Test	% Fat	I.U. Vitamin D		Mg. % Ca		Mg. P %	
			Per gm. Fat	Per 100 ml. Milk	Total	Dialysable	Total	Dialysable
1	Jan.	4.0	1	4	25	—	10	—
2	Feb.	3.3	2.5	8	26	6	13	—
3	,,	4.0	0.5	2	34	8	14	5.2
4	Mar.	3.75	2	7.5	35	11	15	6.4
5	,,	4.0	2	8	37	18	15	8.8
6	Apr.	4.2	1	4	26	17	15	6.3
7	,,	3.9	1	4	32	23	16	7.5
8	,,	3.9	1	4	33	21	15	7.5
9	,,	3.5	1.2	4	33	20	15	6.4
10	May	7.1	1.3	9	30	16	14	3.6
11	,,	6.1	0.7	4	26	14	15	6.6
12	,,	2.4	1.1	2.5	—	—	—	—
13	June	5.9	3	18	31	21	17	9.3
14	,,	4.0	1	4	29	15	12	8.2
15	July	4.5	1	4.5	38	22	14	7.7
16	Sept.	3.0	2.7	8	—	—	—	—
17	Oct.	3.4	2.7	9	—	—	—	—
18	Nov.	5.5	0.7	5.5	26	23	18	6.0
19	,,	3.8	1	4	36	—	17	—
20	,,	4.1	1.8	7	34	22	13	11.0
21	Dec.	5.1	1.7	9	25	18.7	13	8.4
22	,,	3.3	1.6	5	41	39	13	8.0
23	Jan.	4.5	1.5	6.5	28	22	10	7.0
24	,,	4.0	1	4	—	—	—	—
25	,,	4.2	1.2	5	—	—	—	—
26	Feb.	3.5	1	3.5	—	—	—	—
27	,,	3.0	1.5	6.5	—	—	—	—

The milks were also analysed for total and dialysable calcium and phosphorus, the method for the phosphorus analyses being that of Kuttner and Lichtenstein (1930). For determining the dialysable Ca and P we used a suitable modification of the "static" dialysis method employed by Lampitt and his co-workers (1933, 1934, 1937). Usually about 120 ml. of milk, from which as much fat had been removed as possible by centrifugation, was dialysed against 3.3 ml. of water.

This provided about 2 ml. of dialysate suitable for analytical purposes. The results as a whole are set out in Table I. An attempt was made to ascertain whether any correlation could be traced between the results of the analyses of the individual milks and such information as was available regarding the nutritive state of the mother. Unfortunately it was not found possible to obtain precise details regarding the everyday diet of the women, but, by questioning, a certain amount of information was gathered which permitted a rough classification to be made, partly on the basis of the general character of the diet and partly on statements regarding the total income, number in the family, rent, etc.

Factors influencing the Vitamin D Content of Milk

An attempt has been made to correlate the results with various factors which are believed to influence the vitamin D content of cows' milk. In the first place, there is no evidence of a seasonal variation. The mean value of sixteen samples taken during the winter months (October to March, inclusive) is 5.9 I.U. per 100 ml., which compares well with that of 6.2 for the ten summer samples. This is a reasonable conclusion, for one would scarcely expect an effect from the influence of sunshine or skyshine to be noticeable in working-class women in London. The mean value of the whole twenty-six samples is 6 I.U. per 100 ml.

What seem to be significant differences appear when the results are classified according to estimates of the intakes of vitamin D by the women (Table II). The value of these results is open to question because, in the first place, the numbers in the groups are small, and, secondly, because we had not the information to provide an accurate estimate of the intake of vitamin D in the mothers' diet. With this reservation, however, we are inclined to believe that the results show that the vitamin D content of human milk is increased by raising the vitamin D content of the diet. Bunker, Harris, and Eustis (1933) have presented evidence that the administration to women of cows' milk artificially treated to increase its vitamin D value will raise the antirachitic value of their milk.

We are inclined to think—although again caution is necessary in view of the small number of samples analysed—that approximation between the mean antirachitic

potency of the milk yielded by women on diets supplying in all probability between 100 to 250 I.U. of vitamin D daily and that of the milk from women dosed during the latter half of pregnancy with much larger amounts of vitamin D (approximately 1,000 I.U. daily) in the form of halibut-liver oil supplement indicates that 10 I.U. per 100 ml. of breast milk represents about the normal maximum value. Possibly the same evidence can be put forward to indicate that an intake of about 200 I.U. represents the *minimum* daily requirement of the nursing mother. Our results appear to show that the large doses of vitamin D given to some of the mothers over several months of pregnancy failed to bring about anything approaching a proportional increase in the vitamin D content of the milk. It may be, therefore, that there is an optimum concentration of this substance regulated by the mammary gland. It will be recalled that Gerstenberger, Hartman, and Smith (1927) failed to increase the antirachitic potency of breast milk by giving a teaspoonful of cod-liver oil (250 I.U.?) daily to a woman already receiving an adequate diet.

Our estimate of 200 I.U. of vitamin D as the *minimum* intake of the pregnant and lactating woman is in reasonable agreement with the daily intake of 300 I.U. recently recommended by the Committee of the Health Organization of the League of Nations.

TABLE II.—*Attempt to correlate Vitamin D Content of Diet and of Milk*

Estimated Vitamin D in Diet. I.U. Daily	Vitamin D Content of Milk Fat. I.U. per gramme	Vitamin D Content of Milk. I.U. per 100 ml.
Group A. Daily D intakes probably less than 100 I.U.		
35	1	4
50	1	4
50	1	4
70	1	4
70	0.5	4
85	0.5	2
Mean	0.8	3.7
Group B. Daily intake probably above 100 I.U.		
125	3	18
130	2.7	8
145	1.2	4
155	2.5	8
180	1.3	9
200	1	4
220	1.2	4
Mean	1.8	7.9
Group C. Women receiving vitamin D therapy (1,000 I.U. daily as halibut-liver oil) during latter half of pregnancy (figures in first column refer to diet only).		
36	0.7	5.5
60	1.8	7
90	2.7	9
90	1.7	9
190	1.0	4
200	1.5	6.5
Mean	1.5	6.9

Vitamin D Requirement for Bone Formation in Infants

It is necessary now to consider our results from the standpoint of bone formation in infants. There is, or, at all events, there has been until recently, no very clear idea how much vitamin D is required by an infant. For some time past it has been rather generally accepted that artificial feeding with cows' milk should be supplemented with vitamin D therapy. All sorts of doses have been recommended, but a considerable proportion of paediatricians have been in favour of daily doses of the order of 1,000 I.U. It now appears that in the majority of cases this is too much.

In a series of careful studies, in which cows' milk which had been artificially "fortified" in respect to vitamin D was used, Jeans and Stearns (1937, 1938a) were able to show that about 70 to 100 I.U. a day during the first three months will prevent the appearance of rachitic symptoms in the majority of full-term infants. This level of intake, provided by approximately 120 ml. per kg. of body weight of milk containing 12 I.U. per 100 ml., was not found adequate for premature babies, nor did it ensure optimum growth. Full protection was given when the intake of vitamin D was three to four times as great. The very large doses—for example, 1,000 to 5,000 I.U daily—which were so popular in the early days of enthusiasm for vitamin D therapy and which are still not infrequently employed, are probably unnecessary and actually appear sometimes to exert a definitely inhibitive action on growth (Jeans and Stearns, 1938b).

Influence of Calcium-Phosphorus Ratio

It is interesting that a satisfactory intake of cows' milk providing 12 I.U. of vitamin D per 100 ml. has been found to produce good calcification in normal full-term infants, because the amount of vitamin D taken by the young child would be of the same order as that provided by the milk of a well-nourished mother. This probability has to be considered together with the fact that the assimilation of the bone-forming elements is better (40 to 60 per cent.) when the child is fed on mother's milk than when cows' milk is used (20 to 30 per cent.). The reason for this better utilization has not yet been determined, but it may be important that the Ca/P ratio of human milk approximates to that of bone mineral, whereas the Ca/P ratio of cows' milk is considerably smaller.

	Ca (mg.%)	P (mg.%)	Ca/P Ratio.
Human milk	27–34 ..	13–17 ..	2.0
Cows' milk	100–160 ..	70–100 ..	1.5
Bone mineral (dahlite) $2Ca_3(PO_4)_2.CaCO_3$	..	..	2.2

The relatively small concentration of calcium and phosphorus in human milk as compared with cows' milk raises several curious problems, of which the most important has been revealed by the careful studies of Leitch (1937). She has shown that the *total* intake of calcium when mother's milk is taken, much less the quantity actually *retained*, is often insufficient to provide the amount calculated as being requisite to maintain the composition of the body either at the maximum figure of 10 grammes of calcium per kilogram of body weight or at the smaller estimate of 8.13 grammes of calcium per kilogram (Hamilton, 1922).

Consideration of this extraordinary finding has led Dr. Leitch to consider the possibility that breast-fed infants must often exhibit not only imperfect calcification of new matrix but also osteoporotic changes in bones which at birth were relatively firm. It may be a fact that undetected rachitic changes are much more common in breast-fed infants than is suspected (Maddox, 1932), and it may also be true that if it were possible to make histological examinations we would be surprised at the frequency with which osteoporotic changes occur in the first half of lactation (Zarfl *et al.*, 1923). There seem to be only two ex-

planations of the figures Dr. Leitch has produced. Either the newly born infant carries a reserve store of calcium sufficient to provide for adequate calcification during the months when the mother's milk does not provide enough—and it must be borne in mind that there is such a protective storage of iron—or the data of the metabolism experiments which Dr. Leitch has used for her analysis are misleading, perhaps because the milk was not of such a quality as to favour optimum calcium retention.

It remains uncertain in view of the evidence reviewed by Leitch whether changes in the dietary intake of calcium or phosphorus are reflected to any significant extent in the composition of a mother's milk. Our own results, admittedly scanty, suggest that such an effect is not detectable, at all events in the first two or three months of lactation. Some of the mothers we investigated had been receiving about 2 grammes of calcium lactate daily during the latter half of pregnancy, but this supplement to calcium-deficient diets did not appreciably influence the calcium content of their milks.

Conclusion

There is certainly need for more information, not only about the composition but also about the *yield* of milk from mothers whose diet, adequate in all other respects, provides at least 2 grammes of calcium, 1.5 grammes of phosphorus, and 300 I.U. of vitamin D daily. If such milk were made the subject of metabolic investigation on infants it is possible that some of the disturbing discrepancies would be dispelled.

Summary

The literature on vitamin D does not contain precise information as to the range of antirachitic potency of human milk.

The results of an analysis of human milks for vitamin D, calcium, and phosphorus are here recorded and an attempt made to correlate the vitamin D content of diet with that of the milk.

The conclusions derived from the analysis are given.

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THE PATHOLOGY OF CHLORIDE METABOLISM IN MAN*

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During the past ten years considerable significance has been attached to disturbances of the metabolism of chlorides in man. The information gained from observations on patients and experimental work in animals has applications in diseases so diverse as intestinal obstruction, pyloric stenosis, chronic nephritis, oedema, obesity, hypertension, and Addison's disease. The principles which control the chloride balance of the body and determine the nature of the processes of absorption, secretion, reabsorption, and excretion of chloride are of importance in these diseases, and their significance is already reasonably well established. The phenomena which control the exchange of chlorides in tissue cells and fluids are not yet fully explained.

Normal Cycle of Chloride Metabolism

The average normal adult on an ordinary diet ingests about 12 grammes of chloride daily. This can be easily verified by estimating the daily excretion of chloride in the urine. In addition to the urinary excretion, small quantities of chloride are excreted in the faeces and limited amounts in the skin secretions (probably not more than 2 grammes daily in the absence of active perspiration). In forced sweating the skin loss in chloride may amount to 10 or 12 grammes daily (McCance, 1938). It should be borne in mind that clinical analogies to such abnormal skin losses occur in conditions where there is intense sweating, in acute febrile disturbances, in the sweating of tuberculosis and acute rheumatism, in pneumonia, in thyrotoxic crises, and in heavy muscular exertion in hot surroundings.

Apart from external losses by these routes—skin, urine, and faeces—there occurs a continual circulation of chloride to and from the intestinal lumen. The total quantities of chloride in circulation in this way daily in the normal person are somewhat indefinite. Approximate measurements of volume and chloride content of the various alimentary secretions give some basis for calculation, as shown in Table I (McCance, 1936).

Table I.—*Intestinal Secretions: Chloride Content*

Secretion	Vol. (c.cm.) in 24 Hours	Authority	Chloride Content (grammes)
Saliva	1,500	Bidder and Schmidt	7.5
Gastric juice ..	2,000–3,000	Nicol and Lyall	17
Bile	300–500	Pfaff and Balch	4
Pancreatic juice	500–800	Wohlegemuth	8
Succus entericus	3,000	Pregl	18
Total chloride			54.5

These figures are quite approximate, and probably form a conservative estimate.

Nicol and Lyall (1939a and 1939b), for example, as shown in Table II, were able to remove 29 grammes NaCl by gastric aspiration from a male patient in the first day, and a total of 93 grammes in six days' aspiration, the amount on the first day representing the uninfluenced gastric secretion of chloride in this individual.

* Read in opening a discussion in the Section of Physiology and Biochemistry at the Annual Meeting of the British Medical Association, Aberdeen, 1939.

TABLE II.—*Gastric Secretion: Chloride Content*

Date	Gastric Aspiration (c.cm.)	Chloride Content %	Total Chloride (Grammes)
12/9/38	4,260	0.680	29
13/9/38	2,320	0.707	17
14/9/38	2,080	0.628	13
15/9/38	1,690	0.533	9
16/9/38	1,800	0.595	11
17/9/38	2,070	0.641	14

Total chloride secreted: 93 grammes; average, 15 grammes.

In a patient suffering from biliary fistula whom I have been able to investigate recently, the biliary flow showed an average volume of 1,000 c.cm., with chloride content of approximately 7 grammes daily, as shown in Table III.

TABLE III.—*Biliary Secretion: Chloride Content*

Date	Bile Vol. (c.cm.)	Chloride Content %	Total Chloride (Grammes)
24/4/39	780	0.70	5.5
25/4/39	540	0.73	4.0
26/4/39	480	0.69	3.3
27/4/39	720	0.73	5.3
28/4/39	1,200	0.73	8.9
29/4/39	930	0.70	6.5
1/5/39	1,080	0.72	7.8
2/5/39	1,380	0.66	9.2
3/5/39	1,020	0.70	8.5
4/5/39	1,320	0.70	9.3
6/5/39	1,320	0.69	9.2
8/5/39	1,200	0.70	8.5
Average	1,000	0.70	7.2

It would thus seem that about 50 to 60 grammes of sodium chloride is secreted into the alimentary canal in twenty-four hours, and the amount may be considerably greater in certain individuals. The actual rate of secretion is undoubtedly greater than 3 grammes hourly, and must take place relatively quickly during digestion and absorption of meals. This exchange would seem to make considerable demands on the available stores of chloride in the circulating blood and body fluids, an amount which different estimates place between 90 and 160 grammes for a man of 60 kilogrammes of body weight (Bartlett, Bingham, and Pederson, 1938).

We must assume that reabsorption occurs almost as rapidly as excretion, since no major reduction in the plasma chloride level was found by Dodds and Smith (1923) during gastric digestion. These workers found a fall of 10 to 15 mg. per 100 c.cm. in the plasma chloride during the first hour. In the second hour, while gastric secretion remained vigorous, the plasma chloride remained constant, and later showed a slight increase, to return to normal fasting level. The chloride secreted in the gastric contents is very rapidly reabsorbed by the intestine, and again forms part of the chloride store in the tissue fluids and blood plasma. The question of intestinal absorption of chloride is obviously rather a complicated physiological puzzle, since intestinal secretions contain up to 0.64 per cent. NaCl, while the chloride concentration of the intestinal contents for absorption is of the same order. The help of the physiologist is obviously required in the explanation of this anomaly.

Regulation of Chloride Content of Body Fluids

The regulation of the chloride content of the body fluids is dependent on the chloride content of the blood plasma. Most workers agree that this value remains between the limits of 580 and 620 mg. per 100 c.cm., values above 600 mg. per 100 c.cm. being found only occasionally. The chloride content of whole blood is considerably lower at about 440 mg. per 100 c.cm. on account of the low chloride value of the red blood cells. The exchange of chloride between blood plasma and body fluids forms one of the major means for stabilization of osmotic tension between those fluids. Table IV shows the average chloride content of the various body fluids.

TABLE IV.—*Chloride Content of Body Fluids*

Fluid	Chloride (as NaCl) mg. per 100 c.cm.
Blood plasma	600
Whole blood	438
Saliva	460
Gastric juice	670
Bile	700
Pancreatic juice	230
Jejunal juice	750
Ileal juice	400
Cerebrospinal fluid	730
Lymph	630
Milk	160
Sweat	350

The main controlling influences concerned in the maintenance of the chloride content of the blood plasma and body fluids are (*a*) the kidney itself and (*b*) adequate intake of chloride. Of these the former plays the major part, cessation of chloride excretion occurring as soon as the plasma chloride shows any tendency to diminution. So effective is this check against chloride loss that a minimal intake of chloride can be experienced for several days without any reduction of the plasma chloride level. The level of the plasma chloride at which renal excretion of chloride ceases is about 520 mg. per 100 c.cm. (Anderson and Lyall, 1937), as shown in two ways by Tables V and VI.

TABLE V.—*Case of Intestinal Obstruction: After Relief*

Time	Plasma Chloride mg. per 100 c.cm.	Urine Chloride mg. per 100 c.cm.
1 day	467	Nil
2 days	455	20
4 „	467	20
5 „	496	29
6 „	528	154
7 „	555	233
8 „	580	440

TABLE VI.—*Case of Gastric Aspiration*

Time	Plasma Chloride mg. per 100 c.cm.	Urine Chloride mg. per 100 c.cm.
1 day	606	310
2 days	599	204
3 „	526	20
4 „	467	21
5 „	410	10

This level of the renal threshold for NaCl is practically constant in health, although it may be altered in either direction in renal disease, with the kidney failing to pass chloride at levels above the usual renal threshold as in certain cases of renal disease with oedema, or allowing chloride to pass into the urine at values below 520 mg. per 100 c.cm. in some cases of intestinal obstruction and alkalosis with secondary toxic nephritis.

Requirements of Sodium Chloride

Although the average daily intake of sodium chloride is between 6 and 12 grammes, a large proportion of this amount is excreted daily. It seemed of importance, with regard to replacing the loss of chloride from the plasma and tissue fluids in hypochloraemia, to determine the actual basic requirements in chloride.

For this purpose healthy adults, during rest in bed, were placed upon a salt-poor diet and given additions of sodium chloride when chloride excretion had become constant. On mixed ward diets the chloride excretion in these patients averaged 9 grammes daily. On restriction of the diet to 2.1 grammes of chloride daily the chloride excretion fell within four days to an average of 2 grammes, and remained at this level for three days. Upon the addition of 2 grammes NaCl to the diet the chloride excretion increased by 2 grammes, and upon a further addition of 2 grammes NaCl the chloride excretion increased to an average of 7 grammes. The basal requirement of chloride for this period of deprivation is therefore in the neighbourhood of 2 grammes daily while standard conditions are maintained and perspiration avoided (Falconer and Lyall, 1937a).

Results of Chloride Deficiency

McCance (1936) and his co-workers have made us familiar with the effect of experimental chloride deficiency in the normal adult.

By means of repeated sweating by radiant-heat baths and replacement of fluid by liberal water intake, they succeeded in causing a fall in the plasma chloride to 0.468 mg. per 100 c.cm., an increase in the blood urea to 81 mg. per 100 c.cm., with a reduction of sodium and chlorine of the blood plasma, an increase in the alkaline reserve, and increase in blood proteins. The symptoms experienced were severe, and included anorexia and nausea, lack of appetite, mental apathy, muscular cramps, a general sense of exhaustion, inability to undertake effort, and breathlessness and fatigue on exertion.

The symptoms described by McCance correspond very closely to those found in patients suffering from pathological salt deficiency, of which the commonest cause is pyloric stenosis with repeated and copious vomiting. The patient is drowsy, disoriented, and may be obstructive or violent. He is intensely dehydrated. Table VII shows the blood changes in a typical case, with return to normal values on improvement.

TABLE VII—*Patient aged 66 : Pyloric Stenosis*

Date	Blood Urea mg. per 100 c.cm.	Plasma Chloride mg. per 100 c.cm.	Plasma CO_2 vol. %	Plasma PO_4 mg. %
5/12/32	162	408	118	3.1
7/12/32	166	438	92	5.3
8/12/32	150	461	92	4.3
9/12/32	140	480	88	4.0
10/12/32	116	496	—	3.4
12/12/32	114	584	80	—
13/12/32	104	560	72	2.6
14/12/32	78			
17/12/32	64			
3/1/33	35			

In certain instances, if it is found that fluids and saline cannot be replaced efficiently by intravenous medication, it may be necessary to carry out jejunostomy for this purpose (Falconer and Lyall, 1938).

In general, intestinal obstruction at lower levels than the pylorus may result in hypochloraemia, azotaemia, alkalosis, and dehydration if the obstruction is in the upper part of the small intestine; or in azotaemia, dehydration with a variable disturbance of acid-base equilibrium, and no reduction in the plasma chloride (Falconer and Lyall, 1937b). Further variations are possible if fistula is included, as shown by Standard (1938). With duodenal fistula, dehydration and acidosis might actually be produced.

Gastric Chloride Secretion in Pathological States

Since the secretions of the gastric mucosa are reabsorbed normally in lower regions of the alimentary canal, the character of the gastric secretion in pathological states, and particularly during states of hypochloraemia, is of considerable importance in the preservation or restitution of the normal chloride content of the blood plasma and body fluids. Examination of samples of gastric contents taken at random from patients suffering from pyloric stenosis had suggested to us that the gastric mucosa could secrete a juice containing considerable quantities of chloride even when the plasma chloride level had fallen below normal. Suggestive confirmatory evidence that such was the case appeared in several publications.

McCance (1938) found that there was little change in the hydrochloric acid or total chloride content of the gastric juice during experimentally produced salt deficiency in man. Soley, Lagen, and Lockhart (1938) observed no significant alteration in the free acidity or total hydrochloric acid of the gastric juice during experimental hypochloraemia in three healthy men. Katsch and Mellinghoff (1933) removed quantities of NaCl up to 33 grammes in cases of peptic ulcer, with an average resultant reduction of 51 mg. per 100 c.cm. in the plasma chloride and an average fall of 20 per cent. in the volume of the gastric secretions, but without any appreciable change in the chloride concentration. Nicol and Lyall (1939a) investigated a series of patients suffering from pyloric stenosis and vomiting with severe hypochloraemia. Continuous sampling of the gastric contents over twenty-four-hour periods showed that the daily curves of free HCl, total HCl, and total chloride showed practically no difference from similar samples taken after return of the blood chemistry to normal (Table VIII).

TABLE VIII.—*Average Values of Continuous Samples of Gastric Contents during Hypochloraemia and Period of Recovery*

Case	Day	Plasma Chloride mg. per 100 c.cm.	Gastric Chloride mg. per 100 c.cm.	Free Acid	Urine Chloride mg. per 100 c.cm.
1	1st	350	628	26	10
	3rd	496	667	30	10
	10th	525	610	26	214
	11th		(gastro-enterostomy)		
	14th	526	635	28	310
	17th	570	680	34	298

The reverse procedure seemed to be necessary to establish this phenomenon with certainty.

For this purpose Nicol and Lyall (1939b) subjected two patients with pyloric stenosis and gastric hypersecretion, but without changes in the blood chemistry, to a similar experimental procedure. The gastric juices were withdrawn continually for periods up to six days when the blood chemistry showed the changes of gross alkalosis and hypochloraemia. Under these circumstances the gastric secretions showed little qualitative alteration, but decreased in volume (Table IX).

This evidence probably does not add much to the clarification of the vexed problem of the regulation of the gastric secretions, but it certainly seems to be clear that

Table IX

Case	Day	Gastric Juices			Blood		
		Vol. c.cm.	Chloride	Total Chloride (grammes)	Chloride mg. per 100 c.cm.	Urea mg. per 100 c.cm.	CO_2 vol. %
1	1st	—	—	—	606	36	68
	2nd	4,260	0.707	30	599	40	84
	3rd	2,320	0.628	14.6	526	46	91
	4th	2,080	0.533	11	467	—	98
	5th	1,690	0.595	10	410	68	120
	6th	1,800	0.641	11.5	365	75	130
2	1st	—	—	—	540	28	55
	2nd	—	0.415	—	496	27	74
	3rd	2,560	0.450	11.5	—	26	84
	4th	3,020	0.420	12.7	468	36	96
	5th	2,110	0.452	9.5	345	43	95
	6th	1,010	0.397	4.0	336	54	102

the secretion of free HCl and chloride by the gastric mucosa is to a large extent independent of and uninfluenced by gross changes in the chloride content and alkaline reserve of the blood plasma. It is difficult to correlate these results with the findings of Apperly and Crabtree (1931) and Browne and Vineberg (1932), and it seems more probable that Gilman and Cowgill (1931, 1933) are nearer the truth when they suggest that the gastric mucosa shows a one-way permeability to chloride and that the chloride concentration of the gastric juice is such as to bring that secretion into osmotic equilibrium with the blood plasma.

Chloride Metabolism in Addison's Disease

During some of the observations already described on the chloride balance in cases of intestinal obstruction, the opportunity occurred to investigate two cases of Addison's disease.

In both the typical blood chemical changes found by Stewart and Rogoff (1925), Baumann and Kurland (1927), and others in adrenalectomized animals, and by Loeb (1933) and his associates in man, were present during the phases of Addisonian crises. One of these patients, however, had been under observation for several years, and although the presence of Addison's disease had been suspected the diagnosis could not be made with certainty until the recognized changes in the blood chemistry appeared. It was obvious that until this time no method was available by which the diagnosis of Addison's disease could be established with any degree of certainty in the early stages. Anderson and Lyall (1937) were struck by the great difference between the rate of urinary chloride excretion found in those cases, as shown in Table X, and in cases of intestinal obstruction with reduction of the plasma chloride levels.

Table X

Date	Plasma Chloride mg. per 100 c.cm.	Urine Chloride mg. per 100 c.cm.
28/2/37	534	390
29/2/37	531	360
1/3/37	511	290
5/3/37	496	700
6/3/37	488	880
7/3/37	496	470
8/3/37	479	310
	Injections of supracort	
9/3/37	452	270
11/3/37	438	200
12/3/37	502	210

It seemed to us that a method was available for the early diagnosis of Addison's disease from the ratio of the urinary chloride excretion to the plasma chloride level, and we stated that in the absence of evidence of diabetes or renal disease the finding of a chloride concentration in the urine of over, say, 200 mg. per 100 c.cm. when the plasma chloride level is below the minimal normal level of about 530 mg. per 100 c.cm. would strongly suggest the presence of Addison's disease.

Cutler, Power, and Wilder (1938) tested the validity of this suggestion by preliminary investigations on nine subjects with adrenal insufficiency and eight subjects without evidence of disease of the adrenal glands, and later by a standardized procedure in the examination of thirty-six additional subjects—eight with and twenty-eight without evidence of adrenal insufficiency. The test period consisted of three days on a diet containing 0.95 gramme of chloride ion, 0.59 gramme of sodium ion, and 4.1 grammes of potassium, with the addition of 0.033 gramme of potassium per kilogramme of body weight on the first and second days. Blood was drawn at 10 a.m. on the third day and urine collected from 8 a.m. to 12 noon on the third day. Determination of the sodium and chlorine content of the blood plasma and urine showed that "if the concentration of chloride in the specimen of urine on the third day exceeds 225 mg. per 100 c.cm., Addison's disease or adrenal insufficiency is strongly suggested; if it is less than 125 mg., adrenal insufficiency is made unlikely."

Confirmation of the findings of Cutler, Power, and Wilder have accumulated.

Dryerre (1939a) investigated four patients with Addison's disease, five suffering from asthenia not due to Addison's disease, and five normal controls. His results revealed that on the third day of the administration of a salt-poor high-potassium diet the concentration of the sodium in the urine is much higher in cases of adrenal insufficiency than in control subjects. Dryerre did not find the urinary chloride concentration in cases of Addison's disease to differ with such consistency from that of control cases. More recently Dryerre (1939b) has used diminution of the sodium concentration in the urine as an index of response to treatment by cortin and desoxycorticosterone in patients suffering from Addison's disease, and suggests that the method may be of value in standardizing the activity of preparations of cortical extract.

Within the past two years Anderson and I have been investigating patients with some of the signs or symptoms of Addison's disease—weakness, asthenia, pigmentation, hypertension, abdominal discomfort, loss of weight. Our technique differs from that of Cutler, Power, and Wilder, and is more simple.

The patient is given a low chloride diet for a period of five to six days. A shorter period may be necessary. The blood chemistry is investigated at the beginning and end of the period and the urinary chloride concentration compared with the plasma chloride level daily and at the end of the period. The normal ratio of plasma chloride to urinary chloride under these conditions is always greater than 3 to 1. In Addison's disease the urine chloride concentration approaches the blood chloride level, and where the ratio is below 2 to 1 a diagnosis of Addison's disease can be established with certainty.

Summary

This paper indicates the importance of disturbances of chloride metabolism in patients suffering from intestinal obstruction, pyloric stenosis, chronic nephritis, oedema, obesity, hypertension, and Addison's disease.

The exchanges of chloride in the alimentary canal are discussed, both normally and in pathological conditions.

Observations are made on the secretion of urinary chloride in hypochloraemic states, and the changes found in various types of hypochloraemia are illustrated.

It is pointed out that in Addison's disease the reduction in plasma chloride is associated with failure of the kidney to retain chloride.

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NOTES ON PSYCHIATRIC CASUALTIES OF THE FIRST DAYS OF WAR

BY

GEORGE PEGGE, M.A., M.R.C.S., L.R.C.P.

Experience of the first two weeks of war indicates that the special stresses of that period have already produced psychiatric cases and problems of special types not usually met with in peace-time psychiatric practice. Though it may be considered premature, it is felt that a record of impressions of such cases should be made while they are yet in mind, particularly as they belong to a phase of the war which is now passed—a period when the much-discussed mass bombardment of civil populations in this country was considered, and appeared to be imminent, before evacuation was completed and before war morale was established.

Occurrence and Attributability to War Strain

A casualty hospital situated close to a great railway terminus in London is so placed as to receive patients who collapse in special circumstances. The glass-domed station, the crowds, loud-speakers, and confusion of curtailed rail services, together with evacuation of children and mothers, punctuated by air-raid-warning sirens, brought the war home to many as a reality for the first time. War morale had not yet been established by leadership, and a sense of security had not been generated by knowledge of what preparations had been made for the protection of the civilian population. In most of the cases the patient had lost touch temporarily with his or her family.

A striking contrast existed between newly precipitated cases and old patients who came up as usual to the psychiatric out-patients' clinic. These old patients were all asked how the present situation affected their symptoms or themselves. Typical replies were: "I don't take no account of that." "I'm afraid this illness makes me rather selfish. I hardly think of the war." A small minority were troubled by fear of air raids, and it may be that others who failed to attend were those most affected.

The newly precipitated cases were brought in ambulances or by the police, having collapsed in the street or the station. On arrival they were still unconscious or confused. It was possible in all cases to restore consciousness and to obtain names and addresses, etc., in a very short time by reiterated reassurance and encouragement, continued until eyes opened and questions were answered. Typically, attention was apt to wander and irrevelant answers were given to questions. In one or two cases there was wild excitability, and this was usually controllable by quiet confident reassurance and persuasion. Only one true hysterical paralysis was seen. As the object of treatment was merely to enable patients to continue their journey out of London or to return them to their homes it has not been possible to follow subsequent developments in most of these cases. In one case a mother taking two children home from the seaside through London collapsed when she became cut off from them in the crowd. In this, as in other cases, there was a large element of fatigue, lack of sleep, and hunger. Alcohol played a part in a number of them, and there seemed to be an abnormal sensitivity to small quantities.

These cases were fairly equally distributed between the sexes. No children were included. They were of the less-educated classes. About twenty cases in all were seen, and the flow diminished markedly after the first week of war.

Cases simulating Acute Onset of Psychosis or of Severe Neurosis

Five cases fall into this class, and all but one were of the professional classes. There were three men and two women. They were doing responsible work and, except in one case, work directly connected with the state of emergency. There were other significant similarities. Four were intellectual types with a high sense of social responsibility; the state of stress had been established for a considerable time before the war broke out, and they had overworked, neglecting their own welfare for that of others, living on snacks and irregular meals and being unable to sleep adequately. In all the fear of a breakdown had been a factor for some time and had been compensated by increased press of activity, mental and physical. In all the onset was sudden and dramatic.

A man of 30 in a very responsible job calling for speed of decision and acuteness of judgment suddenly lost all energy, and after wandering aimlessly for an hour or so had a "blackout" of consciousness without collapsing. He was brought to hospital ten hours later with symptoms suggestive of paranoid schizophrenia.

A highly conscientious overworking governess of 28 had had sole charge of four small children in the country. She came up to London, losing some trunks on the way. The sight of sand-bagged buildings and the dark night streets seemed to alarm her unduly, and she suddenly said she must go out at once and find a job. She ran into the street and was eventually found in a police station. Two hours later, when seen at hospital, she was wildly frightened and suspicious, believing that a plan existed for her destruction in which the physician was a tool of the Government. She slept well with 15 grains of medinal, but next day was still more frightened and suspicious, and had to be placed in a mental hospital under an urgency order.

A medical man doing important organizing work on night duty had almost complete insomnia for a week and showed obsessional doubts and other obsessional symptoms.

A V.A.D. nurse who had served four and a half years without breakdown during the last war and who had attempted the same standards, disregarding twenty years' advance in her age, had suddenly what was probably a hysterical attack. There were, however, some persisting organic signs, which put the diagnosis in some doubt.

A young postman of 22, of good physique, was seen in a state of acute terror with loss of social sense and all morale, sweating, pallid, and with dilated pupils and crouching posture. He showed regressive tendencies, and passed water in public without recognizing that such an act was unusual. He was not amenable to reason or suggestion, though occasionally unexpectedly he would obey a suggestion. He became a little calmer on taking a sedative, but remained confused and frightened to an extreme degree. Subsequently he was admitted to another institution and failed to improve, regressing further in spite of convulsion therapy.

The severe and dramatic onset and typical symptomatology of this group of cases are in some instances markedly in contrast to the subsequent history. All were removed from the situation of stress and received various forms of treatment, the details of which are not available, but in which rest and sedatives certainly played a large part in most instances. The patient with obsessional symptoms recovered completely and is to return shortly to duty. One of the "paranoid schizophrenics" after three weeks is reported to be well and returning to duty. The other is as yet no better, but has been under care for less than a week. The case diagnosed as "simple terror" had developed more marked schizophrenic katatonic features. The outcome in the V.A.D. nurse is still in doubt, but recovery and return to duty appear probable.

Conclusions

Diagnosis and particularly prognosis in the second group of patients are particularly difficult. The typical features are the high sense of social responsibility adding to the stress of circumstances upon the patient before the onset of the breakdown, and the florid psychotic or neurotic symptoms at the time of breakdown. The outcome of these cases is not clear, but it is suggested that quick recovery is probable in a large proportion. They may easily be confused with true psychoses of acute precipitation. The possibility of relapse cannot as yet be ruled out. The simple cases in the first group are of more purely hysterical and anxiety types, though in the patients seen the hysterical symptoms were still plastic and amenable to suggestive modification. The probability of relapse would seem to be great. In most cases fatigue and neglect of proper meals have been large factors in the precipitation of the condition—factors that are easily removed if the patient can be got away from the situation of stress. Insomnia in some degree has been almost universal before the breakdown.

I have been engaged in diagnosis and disposal and have not had first-hand experience of subsequent treatment, but in view of the rapid recovery of some patients with simple rest away from stress it is to be hoped that the adoption of such methods as convulsion therapy will be delayed until the possibility of rapid spontaneous recovery has been ruled out. The fact that in the first week of war admissions to the observation wards of London County Council hospitals were much in excess or normal would tend to confirm the suggestion that many cases were wrongly diagnosed as psychoses, for it is well known that the great war and the war in Spain did not materially increase the incidence of insanity.

Summary

Two main types of psychiatric cases seen at a casualty hospital since the declaration of war are described:

The first type occurs in those of less strongly established sense of social responsibility and usually of less education. Both sexes are equally affected.

The second type occurs in highly intelligent, highly responsible people of both sexes.

The alarming, often psychotic, symptoms of the second group are not easy to distinguish from true psychoses. The diagnosis and prognosis can only be made after an initial period of treatment.

Cases in which the neurosis was established before the outbreak of war are, so far, in many instances quite unaffected by war stress.

DIABETES AND KIDNEY FAILURE

BY

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The following two cases of concomitant diabetes and nephrosclerosis are recorded in relation to some interesting questions of renal physiology.

Case I

On February 8, 1939, a man aged 56 was admitted to the medical wards of the Coventry and Warwickshire Hospital complaining of his right knee, which was painful and swollen. Three and a half months before admission the swelling had

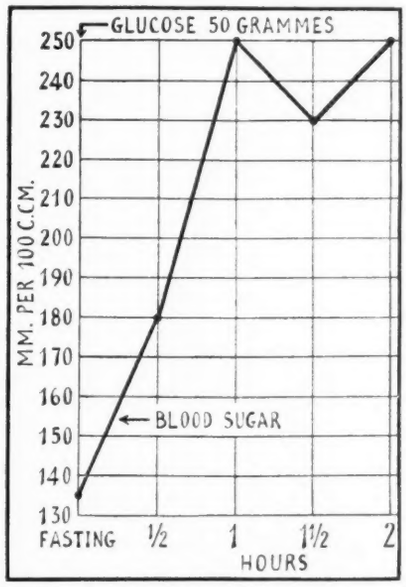


Chart 1.—Case I. The glucose-tolerance curve. Sugar was present in all specimens of urine.

come on acutely in about three hours, and had persisted without remission. Radiographs showed punched-out areas on the external aspect of the right femoral condyle at the junction of the articular and external surfaces and in the part of the tibia which lies immediately adjacent. A radiological diagnosis of gout was suggested. Blood uric acid was estimated at 3.8 mg. per 100 c.cm.

Apart from the present trouble with his knee the patient had always considered himself a healthy man, although he said that he had had diabetes for about seven years. His

urine turned Benedict's solution green. Investigation of the blood showed a diabetic sugar tolerance (Chart 1). As the patient looked pale, a blood count was made. Red blood cells were found to be 3,525,000, with haemoglobin 74 per cent. Free hydrochloric acid was present in the stomach, although reduced, and the icterus index was 6 units. This implied a haemopoiesis which was deficient but not characteristic of pernicious anaemia.

The routine examination of the urine revealed albumin. The blood pressure was 190/120. The retina showed haemorrhages but no exudates. The specific gravity of the urine passed on waking was consistently lower than that of specimens passed later in the day: the usual reading was of the order of 1012. A twenty-four-hour specimen of urine revealed a polyuria of 91 oz. Blood urea nitrogen was estimated at 28.9 mg. per 100 c.cm. Questioned about his condition before admission, the patient stated that he was accustomed to feeling thirsty but that "he fought against it." Usually he passed urine in the night, and he thought that the amount might be between one and two pints.

Commentary on Case I

The presence in the same patient of kidney damage and diabetes raises some interesting questions of renal physiology. The typical dysfunction of nephrosclerosis is failure of urinary concentration: a large volume of urine of low specific gravity is passed. Diabetes, on the other hand, tends to produce a large volume of urine of which the specific gravity in the uncontrolled disease is high, due to the sugar content. Typically the concentrating power of the kidneys is good in diabetes. What is the effect upon the mechanisms of sugar excretion in a diabetic of a kidney in which the powers of concentrating urine are damaged by nephrosclerosis?

Current views of renal physiology describe a glomerular filtration with later concentration by the tubules. Considered as a physical process, filtration implies the passage across the filter of a solution equivalent in concentration to that of the blood. If the glomerulus is a simple filter, the sugar level of the glomerular filtrate should rise and fall with the level of the sugar in the blood. This appears to be Cushny's view. The assumption follows that the renal threshold is to be looked for in the functions of reabsorption and concentration (which are attributed to the tubules), since refusal to filter and the ability to concentrate are not the properties of an ordinary physical filter. In diabetes it is to be assumed that water and threshold substances are withdrawn from the glomerular filtrate and returned to the blood, leaving the post-tubular urine concentrated and of correspondingly higher specific gravity.

From this argument it follows that where the kidney function of concentration is damaged the sugar leakage should be increased. If the glomerular filtrate contained a sugar concentration equivalent to that of the blood, and if the renal threshold depended upon the function of concentration of urine, damage to this function should lower the renal threshold to sugar and increase the degree of glycosuria.

The case above recorded offers a critical experiment upon this point. The glucose-tolerance test shows that a lowering of the renal threshold does in fact result from the kidney damage. Glycosuria occurs at a blood-sugar level of 146 mg. per 100 c.cm., although at the end of two hours the blood sugar remains high (224 mg.). The conclusion is that dysfunction in urinary concentration does lower the renal threshold to sugar. This fact is of importance in the interpretation of glycosuria in diabetics suffering from kidney damage. In such patients sugar in the urine may correspond to blood-sugar levels of much lower and more normal character than is usual in diabetes.

If this be accepted, however, a further question arises. 140 mg. of blood sugar per 100 c.cm. is a level within the limits of what may result from a large carbohydrate breakfast. This being so, why is it that nephrosclerotics do not commonly produce a glycosuria as a sort of "renal leak" induced by dysfunction of urinary concentration? It appears that some factor other than failure of concentration and reabsorption must be at work in diabetics to produce a glycosuria from low blood-sugar levels, since this does not occur in uncomplicated nephrosclerosis.

Case II

In attempting to confirm these views a second case was investigated. A woman aged 67 was admitted on February 26, 1939, complaining of breathlessness, pain in the chest, swelling of the ankles, and retching. The oedema of the ankles had been present twelve months, but was getting worse. Breathlessness dated back fourteen days. Blood pressure on admission was 160/95. This rose to 200/110 after three weeks, when the oedema had cleared. A previous diastolic reading of 120 mm. Hg had been recorded some months previously. A history of polyuria was elicited; the patient stated that she was accustomed to pass water about three times during the night, and she estimated the quantity at three pints. The urine contained albumin. At the time of admission extensive oedema was present. Blood urea nitrogen was estimated at 51.8 mg. per 100 c.cm.

These findings suggested a case of nephrosclerosis passing into uraemia. The need for the immediate use of diuretics vitiated measurements of twenty-four-hour urinary volumes and of specific gravity. The history of polyuria, however, is evidence of long-standing failure of renal concentration, particularly as albumin had been present in the urine six months previously.

The patient stated that she had suffered from diabetes for fifteen years. Her urine turned Benedict's solution green. The blood-sugar curve is shown in Chart 2.

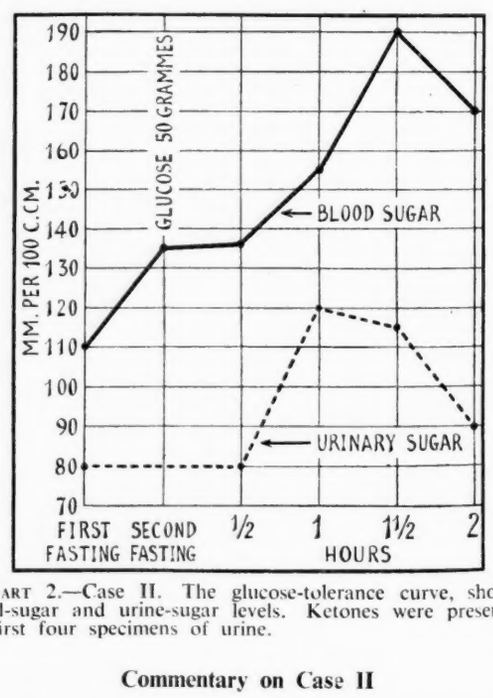


Chart 2.—Case II. The glucose-tolerance curve, showing blood-sugar and urine-sugar levels. Ketones were present in the first four specimens of urine.

Commentary on Case II

The effect of the kidney damage upon sugar excretion is shown by the glucose-tolerance curve. Here to verify results an extra blood-sugar estimation was carried out an hour before the tolerance test, and the bladder was then

emptied by catheter. This investigation showed that from a fasting blood-sugar level of 111 mg. per 100 c.cm. the patient was passing 85 mg. per 100 c.cm. of sugar in the urine. The renal threshold therefore was below 110 mg. One hour after 50 grammes of glucose had been ingested the blood sugar had risen to 154 mg., and urine obtained half an hour after this specimen showed 120 mg. per 100 c.cm. The blood-sugar level rose to 184 mg. in one and a half hours, and remained at 168 mg. at the two-hourly interval.

These results show that the renal threshold to sugar had been lowered by the kidney damage to a level suggestive of a "renal leak." That this is not the explanation is evidenced (1) by the diabetic lag which gives a blood-sugar level of 184 mg. per 100 c.cm. in one and a half hours and 168 mg. at the end of two hours; (2) by the presence of ketosis in the urinary specimens, revealing a deviation of fat metabolism.

This case therefore confirms that where diabetes and nephrosclerosis coexist the urinary findings in respect of sugar represent a different physiological state from that which obtains in ordinary cases of diabetes uncomplicated by nephritis. In uncomplicated diabetes the same degree of glycosuria represents a profounder disturbance of the *milieu* of the tissue cells than obtains in cases complicated by nephritis. The logical conclusion is *that, so far as the diabetes is concerned,* the mild diabetic is better off with nephritis than without it. Whether this supposition is borne out in experience time and observation will reveal.

The evidence of this investigation has obvious bearings on insulin therapy. In uncomplicated diabetes, glycosuria may be taken as evidence of a raised blood-sugar level which may require to be lowered by insulin. In the nephritic, glycosuria has not the same significance. It is likely to be present in cases in which the blood sugar is not raised to a degree likely to be toxic to cell function, and if insulin were to be pushed in these cases, under the guidance of urinary glucose, it seems probable that dangerous and even destructive hypoglycaemia might be induced.

Summary

Two cases are recorded in which diabetes and nephrosclerosis coexisted.

A theory is offered that may explain the fact that the diabetic with nephritis often does surprisingly well.

The conclusion is drawn that the mild diabetic is better off with nephritis than without it.

I wish to express my thanks to Dr. A. J. Wilson for permission to report his cases and to Dr. Wright for the assistance of his department in the sugar estimations.

Evaluation of Disinfectants.—It is proposed in two papers by different authors (whose results do not agree) that disinfectants intended for clinical use should be submitted to tests of toxicity for mammalian tissue as well as tests of capacity for killing bacteria. The method employed by Bronfenbrenner *et al.* is to determine the diminution in oxygen uptake by both a bacterium and a suspension of mouse liver caused by exposure to various concentrations of the disinfectant. Salle and his colleagues, on the other hand, employ the older method of comparing a phenol coefficient obtained in the ordinary way with the results of exposing tissue cultures to the action of the disinfectant.—Evaluation of Germicides by Manometric Method. J. Bronfenbrenner and J. Doubly. Evaluation of Group of Germicides by Tissue Culture Technique. A. J. Salle, W. A. McOmie, I. L. Shechmeister, and D. C. Foord.—*J. Bact.* June, 1939, **37**, 583, 639.

Clinical Memoranda

Simultaneous Colles's Fracture and Backward Dislocation of the Elbow

The following case would seem to be of interest in view of its rarity. Usually when a fall on the outstretched hand results in a Colles fracture, this happening absorbs much of the force of impact. Further, the victim "crumples up," thus preventing any continuation of rigidity at the elbow-joint which is necessary to allow transmission of force to the lower end of the humerus as a fulcrum for dislocation.

Case Report

A healthy undergraduate aged 21 was running down the stone steps of an underground lavatory on May 20, 1939, about 10.30 p.m., when he slipped and fell heavily on his outstretched left hand. He walked back to his college in great pain at the wrist-joint and elbow-joint, and with a useless left arm. After first aid had been rendered he was taken to the Evelyn Nursing Home.

On examination the left wrist showed the classical "dinner-fork" deformity, and a Colles fracture was evident; the left elbow showed considerable deformity, the olecranon projecting backwards, and the ordinary signs of dislocation. A general anaesthetic (evipan and chloroform and ether) was given, and reduction was effected by manual traction and manipulation at each joint, starting with the elbow. The wrist was put up in a non-padded "castex" cast, after the pattern of Böhler. "Castex" has a celluloid instead of a plaster-of-Paris basis, and is extraordinarily light, therefore encouraging function. The elbow was bandaged over plenty of wool and placed in a sling. One-quarter grain of morphine was ordered. The *x*-ray report by Dr. E. V. Bevan next day (May 21) stated that the position of the fragments at the wrist was perfect, and that there was a tiny fragment torn off the coronoid process of the ulna. The usual considerable swelling developed (arm, one and three-quarter inches; forearm, two inches).

After-treatment.—It was impossible to get the patient to carry out the modern (wrist) treatment of immediate full use of the hand and fingers because of the tremendous bruising and swelling involving the origins of the forearm muscles. Any attempt to use the fingers during the first week or two caused great pain and inhibition. Progress in function of the wrist was therefore slowed up very greatly. Conversely, this relative stagnation of activity and circulation in the forearm muscles undoubtedly held up the absorption of the extravasation from the neighbourhood of the elbow-joint, as it tended to track distally. Radiant heat and massage were given, and *active* movements encouraged at the elbow-joint.

On *June 13* all swelling had disappeared, but movement at the elbow was very restricted—flexion to just over 90 degrees and extension limited by about 40 per cent. The "castex" was removed from the wrist, and strapping with elastoplast, reinforced by split-tailed "paragon" plaster, was substituted. The movements were good, but not full, and slight swelling was present.

On *June 19* flexion of the elbow had improved to about 90 per cent. normal, but extension was still restricted by 30 degrees. The strapping was removed from the wrist, which was still a little "puffy"; the movement was not quite full.

Commentary

This state of things at the end of a month contrasts forcibly with the usual *full* function and *normal* appearance of the ordinary Colles fracture attained by Böhler's methods. It is in still greater contrast with the normal progress of a dislocated elbow unhampered by a broken wrist and allowed the effect of forearm function. I recorded a case in the *Journal* (1935, **1**, 15) of a

Cambridge scrum-half who played rugger and gained his "blue" in this important key position of accurate passing nineteen days after backward dislocation of the elbow uncomplicated by other injuries.

Apart from the coincidence of the double injury, therefore, it would appear that each lesion delays the recovery of the other, and that restoration of full function of either joint is considerably postponed thereby.

Cambridge. R. Salisbury Woods, M.D., F.R.C.S.

Bell's Palsy treated by Incision of Sheath of Facial Nerve

The following case may be considered of sufficient interest to warrant publication.

Case Record

A boy aged 13 was referred to me early in November, 1938, on account of a Bell's palsy of two weeks' duration following a cold. There had been intermittent slight otalgia on the affected side. Upon examination it was found that left-sided facial paralysis was complete. There was very slight hyperaemia of the tympanic membrane with slight mastoid tenderness. The patient, who was and remained afebrile, was treated for two weeks by conventional local and general therapeutic means. As there was no evidence of improvement in the paralysis, and as the existence of Wallerian degeneration was proved by the absence of response to faradic stimulation, the nerve was exposed in the Fallopian aqueduct by means of small chisels and bone curettes from the mastoid foramen to its forward bend beneath the lateral semicircular canal. The sheath, which appeared normal, was slit up with the point of a Graefe cataract knife for the same distance. The manner in which the ostensibly hyperaemic nerve protruded through the slit sheath offered immediate and striking proof of the compression to which the inflamed nerve was being subjected.

The wound healed by primary union. The patient left hospital on December 6, at which time faradic response was still absent, though the tone of the facial muscles seemed to have improved. When next seen on February 8, 1939, the facial paralysis had quite recovered and the hearing was normal.

The late A. B. Duel, in two special lectures delivered at the Royal College of Surgeons on October 10 and 11, 1934, stated that from 15 to 20 per cent. of cases of Bell's palsy underwent a violent toxic infection with a severe inflammatory reaction (a compression within the Fallopian aqueduct) which renders the axons useless; in a day or two faradic response disappears. In such cases the regeneration is never complete, the amount of recovery bearing a definite relation, as in the cases of accidental or traumatic origin, to the severity of the initial lesion.

Arguing on the success which attended his experiments on rhesus monkeys in which the nerve was exposed and injured, Duel and his co-worker, the late Sir Charles Ballance, maintained that the cases of Bell's palsy which make but a partial recovery ought to have the nerve in the Fallopian aqueduct uncovered early and be decompressed by incision of the sheath *at that stage*. He further maintains that careful attention to the electrical responses will allow of differentiation between the simple potentially recoverable cases and those which are violent and in which partial or complete paralysis will persist. Duel and Ballance corroborated their theoretical and experimental work by the brilliant results they obtained in practice, in one case of palsy of ten years' duration.

The operation was done in the case described above because clinically it belonged to the smaller percentage of "violent" cases.

Cork. J. B. Horgan, M.B., D.L.O.

Reviews

IMPAIRED FERTILITY

Sterility and Impaired Fertility. Pathogenesis, Diagnosis, and Treatment. By Cedric Lane-Roberts, M.S., F.R.C.S., F.R.C.O.G.; Albert Sharman, M.D., M.R.C.O.G.; Kenneth Walker, F.R.C.S.; B. P. Wiesner, D.Sc., Ph.D., F.R.S.Ed. With a Foreword by Lord Horder, G.C.V.O., M.D., F.R.C.P. (Pp. 419; 87 figures; 3 plates. 14s. net.) London: Hamish Hamilton. 1939.

Sterility and its treatment has in the past received scant attention in most gynaecological textbooks, and the inquiring reader has had a difficult task to obtain a comprehensive view of modern work on this subject. This new publication by eminent workers in this country supplies a real need. A much larger field is covered than is indicated by the title, for almost every aspect of reproductive physiology in the human species is discussed. A considerable amount of space (116 pages) is devoted to the methods of examining seminal fluid, and, as is to be expected, Dr. Wiesner's methods for distinguishing spermatozoal abnormalities are described at length. Special attention has also been given to the technique of testing for tubal patency, and there is a full discussion with numerous illustrations of the newer methods of salpingography. The technique of endometrial biopsy is excellently described, and many less usual topics, such as testicular puncture and artificial semination, receive full attention.

In compiling a book on such a large subject it is perhaps inevitable that there should be a certain amount of overlapping between the sections. This is most noticeable with regard to endocrinology, and particularly so with regard to the gonadotrophic hormones. The authors have adopted various combinations of letters to express the nature of the hormone preparations for clinical use: thus extract of the anterior lobe of the pituitary gland is designated "ALP." This title has an awkward resemblance to "APL," which has hitherto been commonly used by American writers to describe an entirely different preparation. In spite of recent official recommendation the adjective "gonadotropic" is used in preference to "gonadotrophic"; and it seems that the respectable compound word "non-ovulation" must give way to the doubtful hybrid "anovulation." The sections on hormone treatment are somewhat discursive, and are written in an enthusiastic rather than a critical manner; better results are implied than the authors' own figures seem to justify. Statements without statistical backing such as "the administration of chorionic hormone is, as a rule, successful in preventing abortion" are not helpful.

Appendices are added in which biological tests are described, and technical details concerning the preparation of certain gland extracts are enumerated. The book is lavishly illustrated and the reproductions are of a high order. We can confidently recommend this publication as an up-to-date exposition of modern work on human reproductive physiology and particularly of the problems connected with impaired fertility in the male and female.

ARTERIAL EMBOLISM IN THE LIMBS

Les Occlusions Artérielles Aiguës des Membres: Formes Cliniques, Indications Physiopathologiques et Thérapeutiques. By H. Haimovici. (Pp. 124; 26 fr.) Paris: Masson et Cie. 1939.

This book follows the author's monograph on arterial embolism in the limbs which we reviewed last year. Unlike that work, which dealt largely with the experi-

mental and pathological aspects of peripheral vascular occlusion, the present volume is not illustrated, and is more concerned with the clinical and therapeutic features. It also covers a wider field inasmuch as arterial obliteration by causes such as injury and inflammatory lesions is considered as well as that due to embolism. Professors René Leriche and J. Fiolle wrote a preface to the former volume, Professor Fiolle introduces this one. It worthily maintains the high standard of the former work and does credit to the Faculty of Medicine of Marseilles, which, along with the Strasbourg School headed by Leriche, is achieving a reputation for its contributions to our knowledge of occlusive vascular disease.

This book consists of six chapters, the first dealing with physiopathological considerations, the second with the syndrome of acute arterial occlusion, while the remainder consider in turn clinical features, diagnosis, prognosis, and treatment. Difficulties in distinguishing between arterial occlusion the result of embolism and that due to thrombosis are considered in detail. When the result of embolectomy is doubtful or when for technical reasons this operation is not feasible, Haimovici advocates arteriectomy, but treatment by drugs, vascular exercises, injection of the sympathetic ganglia, and the indications for amputation are also considered. The six chapters are divided into conveniently arranged and well-headed sections and follow a short general introduction in which the scope of the work is indicated. References are scarce and neither listed nor given in detail; there is no bibliography and historical aspects are not considered. The absence of illustrations has already been commented upon, but these are defects in an otherwise excellent account of the subject. Clinicians generally and surgeons in particular should be familiar with this work dealing with a subject which we in this country have perhaps tended to neglect.

IMMUNOLOGY

Immunity: Principles and Application in Medicine and Public Health. By Hans Zinsser, M.D., John F. Enders, Ph.D., and Le Roy Fothergill, M.D. Fifth edition of *Resistance to Infectious Diseases.* (Pp. 801. 28s. net.) London: Macmillan Company. 1939.

The last twenty years have seen a great increase in the application of immunological knowledge to medicine and public health. At the same time the work with synthetic antigens, largely initiated by Landsteiner, and the quantitative work of Heidelberger have made antigen–antibody reactions much more comprehensive. In order to aid the practitioner to understand more fully methods used in practice in the light of the new theoretical knowledge, and to stimulate laboratory workers by examples of the practical application of their work, Professor Zinsser, with the co-operation of Drs. Enders and Fothergill, has rewritten *Resistance to Infectious Diseases* under a new title. It is now divided into two sections—"Principles and Theory" and "Special Immunological Problems of Individual Infections."

The second section contains thorough discussions of, for example, immunization against diphtheria, the serum treatment of pneumonia, and the immunological aspects of virus diseases and of scarlet fever and streptococcal infections. The first section is unequal. There is a full treatment of hypersensitiveness, the practical significance of which appears particularly in the chapter on tuberculosis. There is a very good account of iso-antibodies and blood groups. The treatment of the relation of the specificity of antigens to chemical structure is clear and thorough; but the treatment of precipitation and agglutination reactions seems inadequate. There is little about the antigenic structure of bacteria; little also about the permanent effect of one immunization as shown by the prompt appearance of large amounts of antibody in the serum on a later injection of antigen. It is also regrettable that a book of this type should perpetuate the error of speaking of the two fractions into which serum proteins are separated by dilutions of serum with distilled water as the globulin and albumin fractions. The index is more than usually annoying; thus, if the reader looks up "Arthus phenomenon" he is referred to hypersensitiveness, and then has to look through a column of references to hypersensitiveness before arriving at "Arthus phenomenon."

THE TISSUES OF THE BODY

The Tissues of the Body: An Introduction to the Study of Anatomy. By W. E. Le Gros Clark, F.R.S. (Pp. 372; 109 figures. 15s. net.) London: Oxford University Press. 1939.

This work by Professor Le Gros Clark is the type of book which for a long time has been desired by teachers of anatomy. It embodies a large amount of information which has been acquired during the last ten or fifteen years and has not yet been adequately recorded in general textbooks. This material has been put together in a succinct form, accompanied by valuable comments and references to the articles in which the subjects were originally described. Beginning with a brief reference to the anatomy of the cell and early development of the human embryo, there follows a description of the connective tissues, including cartilage and bone, in which allusions are made to the recently described cartilaginous canals in the epiphyses of long bones and the vascularization of articular cartilage. This is succeeded by a chapter on the structure and growth of bone, illustrated by coloured photographs of madder-fed pigs, and diagrams showing the manner in which bone is remodelled by the combination of growth processes with an absorption mechanism which preserves the contour of the bone. A review is also given of the biochemical factors involved in the deposit and absorption of lime salts, the effects of certain enzymes circulating in the blood, and the evidence afforded by *x*-ray films of permanent condensations in long bones, which mark the original site of the epiphyseal lines during temporary arrests of growth, these condensations having occurred during childhood as a result of illnesses of a febrile nature. The chapter on blood vessels is especially noteworthy; it includes a summary of the important work on the growth and innervation of blood vessels by Clark and Clark, who have perfected a means of direct observation of the growth of capillaries and circulation of the blood in a transparent chamber inserted into the ear of a rabbit. Two camera lucida drawings of these are reproduced: one shows two separate *non-anastomosing* lymphatic and blood vessel plexuses within the same field; the other records of the growth of a lymphatic capillary towards an extravasation of blood and the subsequent picking up of red corpuscles by the newly formed lymphatic sprouts and wandering cells.

Later the author reviews the observations and deductions of Boeke, Head, Stopford, Waterston, and Woollard on the innervation of the skin, and he then discusses the cerebrospinal and sympathetic nervous systems partly from the historical standpoint, partly from the experimental, physiological, and morphological aspects. The latter group includes references to chromatolysis, cell atrophy, retrograde cell degeneration, allusions to the older methods of Wallerian and Marchi degeneration, and observations on the degeneration of "terminal boutons" and nerve end-

ings. Finally there is a review of recent work on the vascular supply of the central nervous system, comprising observations on the relative vascularity of different parts of the brain; the intracranial circulation; the effects on the circulation of nervous activity; the disposition and closeness of the capillary plexuses, their relation to the nerve cells and particularly to cell collections in the hypothalamus.

With reference to the subtitle of this work we may confidently state that it will be read with interest and profit by many besides those students of anatomy to whom the author offers it as an introduction.

SURGERY AND RHEUMATIC DISEASES

Der Rheumatismus. Chirurgie und Rheumatische Krankheiten. By Dozent Dr. A. Fonio. (Pp. 235; 26 figures.) Dresden and Leipzig: Theodor Steinkopff. 1939.

In this small volume Dr. A. Fonio of Berne summarizes our knowledge of rheumatism and the so-called rheumatic diseases. An account of the clinical manifestations presented by acute and chronic rheumatism in different parts of the body, their differential diagnosis, and the hypotheses that have been advanced to account for the so-called rheumatic diseases comprise the bulk of the work. Some idea of its scope may be gathered from the fact that there is a special section on haemophiliac joints, and that such conditions as tenovaginitis stenosans, von Bechterew's spondylitis, and the different varieties of osteochondritis are dealt with in detail, while reference is also made to such affections as Morton's metatarsalgia and prepatellar bursitis. The difficult problem of the relation of tuberculosis to rheumatism is discussed in some detail. There are twenty-six illustrations, mostly of radiographs showing the osseous changes in such conditions as Kienboch's disease and Calvé-Legg-Perthés osteochondritis.

The illustrations break up pages of well-printed text, which is clearly set out under appropriate headings. A list of the source of references from which the text has been compiled is given and occupies three pages, but a more complete bibliography to an otherwise very fully discussed subject might be advisable in a second edition. Author and subject indexes are provided. This is altogether an admirable work which is worthy of translation into English.

Notes on Books

The third edition of Dr. Douglas Kerr's well-known textbook, *Forensic Medicine*, has been enlarged to include consideration of the effects of several Acts of Parliament, notably the Matrimonial Causes Act, 1937, and the Infanticide Act, 1938. He has rewritten the section on professional secrecy at the beginning of the book with relation to pregnancy, confinement, abortion, attempted suicide, venereal disease, crime, and other matters: his attitude is substantially that professional secrecy should be maintained except in extreme cases where the public interest demands a disclosure. Considering that the book is largely intended for students, it would be improved by an amplification of the sections dealing with civil aspects of the subject, or medical jurisprudence proper—for example, testamentary capacity, business relationships, negligence, consent, and the liability of hospitals. The inclusion of the subjects of criminal and civil negligence in the chapter on wounds still seems incongruous with all respect to the author's justification of their inclusion there for teaching purposes. The book remains an admirably clear and useful presentation of a wide subject for those who are not immediately concerned with it. It is published at 15s. by A. and C. Black.

The Language of the Dream by Dr. Emil A. Gutheil is published at 15s. by the Macmillan Company. It contains a wealth of examples of dreams, the interpretation of which illustrates the personality of the dreamer especially in relation to neurosis. The author is a disciple of Steckel and claims that it is possible to build up a "language of dreams," since the symbolization employed in dreams is essentially restricted. He believes that much of the free association of patients in relation to dreams enjoined by Freud is a waste of time and indeed in many cases misleading. He claims that the method of "active analysis" in which the analyst does the interpretation is time-saving and successful. In so doing he does not use a rigid interpretation of symbols, but, knowing that the possible meanings of symbols are few, he is able from knowledge of other factors relating to the patient and by comparison with other dreams to pick out the real meaning for the particular patient without much difficulty. He considers that other schools of psychopathology have recently neglected the dream and that in any case their approach is one-sided. The author certainly makes out a case for his slogan of "back to the dream" and shows how it often illustrates both the life plan of the patient and his principal difficulties and resistances. The book is readable and logical in its arrangement and will certainly stimulate thought among all those interested in psychopathology and psychotherapy.

Preparations and Appliances

A NEW TYPE OF COMBINED OBSTETRIC COUCH AND DELIVERY TABLE

Professor Chassar Moir, M.D., F.R.C.S.Ed., F.R.C.O.G., writes from the Nuffield Department of Obstetrics and Gynaecology, University of Oxford:

An obstetric couch should combine three distinct features. It should be a bed of reasonable size and comfort; it should be instantly convertible to an operating table for the lithotomy position, and it should have an easy means of lowering the head end for treating a shocked patient. In this country an additional problem of design is presented by the fact that it is customary to conduct normal deliveries with the patient in the left lateral position; a bed of unusual breadth is therefore generally required, but, as will be seen, this difficulty can be overcome by a simple alternative arrangement which avoids the necessity of pulling the patient into a cross-bed position.

The details of a new type of combined bed and operating table and its method of use are clearly shown in the accompanying pictures. The bed is absolutely rigid and has no tendency to slide on the floor. The head rail can be removed for convenience to the anaesthetist. The height is convenient both for normal delivery and for forceps application with the patient in the lithotomy position. When the lower portion is pushed in much less room is taken up than with an ordinary bed, and the new couch is therefore specially useful where space is restricted. Lastly, while this bed is not designed as an operating table for laparotomies, it can, in point of fact, be put to this purpose. On several occasions circumstances have made it necessary to use the couch for performing Caesarean section, and although it is unnecessarily broad for the purpose (3 feet) no undue difficulty is experienced by an operator of average height. For abdominal operations the slight Trendelenburg tilt can be used to great advantage. Before starting the operation, however, it is advisable to place a small support, such as a builder's brick, under each of the two lower legs; the degree of tilt available is then considerably increased.

This bed has been developed in the Nuffield Department of Obstetrics and Gynaecology and has been in use in the maternity wards of the Radcliffe Infirmary, Oxford, for nearly a year. It has proved to be a great boon to both the medical and nursing staffs, and in particular it has been welcomed by the labour-ward sisters because of the help it gives in conducting delivery in the left lateral position. As will be seen, certain features found in other obstetric beds have been borrowed and combined with new ideas. My thanks are due to Mr. Carnac Rivett for allowing me to copy his pattern of leg support for left lateral deliveries. I am greatly indebted to the generous help of Mr. H. R. Hoskins, who has been responsible for putting the design into practical form. The bed is made by Messrs. Hoskins and Sewell, Ltd., Midland Works, Bordesley, Birmingham. I have no financial interest in its manufacture or sale.

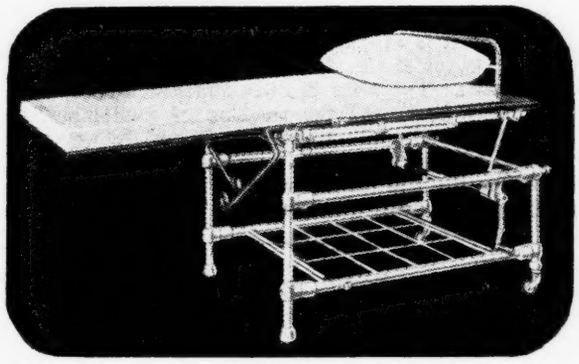


FIG. 1.

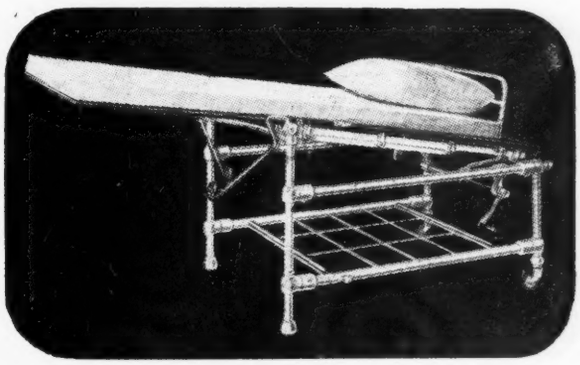
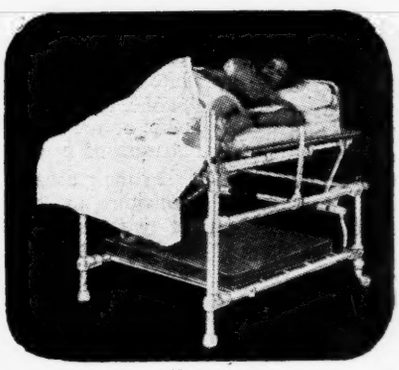


FIG. 2.

FIG. 3.



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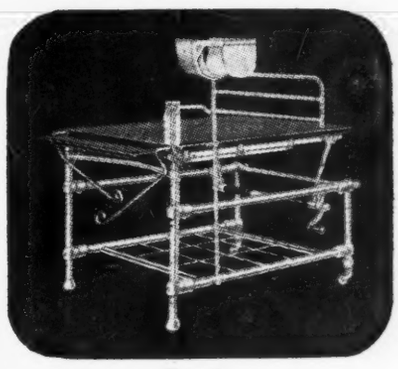

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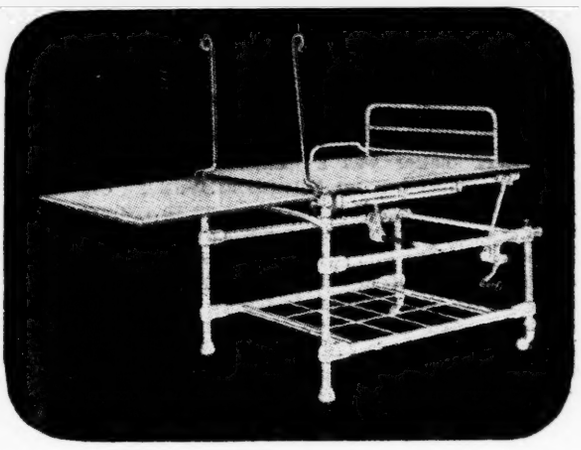

FIG. 6.

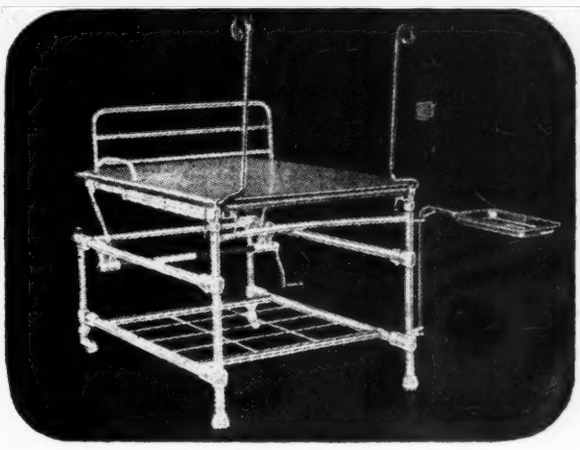

FIG. 7.

FIG. 1.—Normal position of bed. The castors on the legs at the head end allow the bed to be easily moved when the labour room has to be cleaned. The head-rail can be detached for convenience if an anaesthetic is to be administered.

FIG. 2.—By turning the handle the bed can easily be put in the head-down position for treating shock.

FIG. 3.—For left lateral delivery a foot support is dropped into slots and the lower section of bed is pushed into a convenient position. (See also Fig. 4.) Note the pillow-retaining rail at right side of bed.

FIG. 4.—Position for left lateral delivery. Note that the lower section of the rubber mattress is now accommodated on a shelf below the bed.

FIG. 5.—During the actual delivery the patient's upper leg is supported on a cradle.

FIG. 6.—The preparation for lithotomy position can be made by a nurse single-handed. The lower section of the rubber mattress is removed as before. The supports for the legs (which are permanently attached to the bed) are swung round into the upright position, and the patient's legs are raised and secured in the usual manner.

FIG. 7.—Finally, the lower section of the bed is pushed in. The obstetric couch has now become an operating table. There is ample room for a bucket to be placed below the bed, and there is no obstructing metal work to be soiled with blood, etc. The small instrument tray may be attached to the side of the bed, on which can be arranged the instruments necessary for perineal repair. Even when dealing with a heavy patient all manœuvres can be performed by one nurse.

MATERNITY HOSPITALS IN "EVACUATED" LONDON

The maternity hospitals of London are working under more than ordinary difficulty. The position was complicated in the first instance by the proposed evacuation of expectant mothers, then by the refusal of many of the women to be evacuated, and finally by the return to London of a number of women who had gone to the reception areas. Such returns have taken place so frequently that the new word "de-evacuation" has had to be coined. In some cases, we were told, it is the husbands who have insisted on the wives' return owing to dissatisfaction with country midwifery and other arrangements, but this must not be taken as a reflection on the services in reception areas generally.

Queen Charlotte's

On inquiry at Queen Charlotte's Maternity Hospital, the largest in the country, we were informed that it was carrying on as usual in the old buildings in Marylebone Road, except that it has only sixty beds in place of the usual eighty. At the new Queen Charlotte's at Hammersmith the laboratories have been temporarily closed, the Medical Research Council having withdrawn the leading workers for duty elsewhere, and the isolation building has been taken over by the borough council for other purposes. The new buildings, one of them approaching completion, cannot be used at the present time. Two special difficulties were mentioned at Queen Charlotte's, and no doubt they apply elsewhere. One of them is financial, due to the reduced earnings of the husbands of patients. The other arises from the fact that practically all the honorary staff had volunteered for national service, and on the outbreak of war took up duty in the outer hospitals of the sectors. With regard to teaching, it is the earnest desire of Queen Charlotte's that medical students and pupil-midwives should present themselves at the school as and when the teaching staff return. Such classes at the hospital as are now held are full to overflowing, some other hospitals in London having suspended their teaching facilities. The clinics are being maintained, and the domiciliary service is as nearly as possible on normal lines. The motor-cycles used by the forty midwives, on which they carry all their equipment, do eighty miles to the gallon, so that petrol restriction is not likely to affect this branch of the hospital service. The district covered by Queen Charlotte's is a very wide one, extending over the west of London and "half way up the Great West Road." One unhappy result of the closing down at Hammersmith is that the human milk bureau has had to go out of action temporarily. This was a service of national importance, and the hospital is now hard put to it to supply human milk for desperately ill babies.

Other Institutions

Another of the great maternity institutions, the City of London Maternity Hospital, which ordinarily has eighty-one beds available, is carrying on with sixty-seven in the City Road, but it is also supplying a maternity unit for a reception district in Hertfordshire, and has a branch hospital at Hatfield at present occupied by twenty-five patients. The City of London Maternity Hospital is also admitting private patients and is carrying on with its district work in the city area. Both at the City Road and in Hertfordshire pupil-midwives are being taught and post-certificate instructions given, as well as a course for nurses in analgesia. It was mentioned at the City Road that owing to the fact that the hospital is taking emergency cases which would ordinarily have gone to St. Bartholomew's or the London Hospital, as many as twelve Caesarean sections were done during the first three weeks of September.

The General Lying-in Hospital in York Road, Lambeth, which is the third of the great midwifery teaching hospitals, is closed except for office administration and for the domiciliary service, which is being carried out as usual—indeed to a greater extent than usual—in the neighbouring boroughs of Camberwell and Walworth. The closing of the hospital is due to its situation, which was considered not suitable for war-time hospital planning, but it has been entrusted with the care of lying-in and expectant London mothers in three districts in Hertfordshire—though not mothers from the particular district in London in which it is accustomed to work. These districts are St. Albans, Radlett, and Ware, where houses have been taken for the purpose, and teaching is fully carried on. At the Mothers' Hospital (Salvation Army) at Clapton, which has one hundred beds, fifty are at present occupied, and it is expected that the other fifty will be used as the Ministry of Health desires the hospital to admit gynaecological cases. The eight districts attached to this hospital are also very busy, and the teaching of pupil-midwives is proceeding as usual. The outstanding fact of the whole situation is that a larger number of women are being confined in their own homes, and the midwives on district duty will have a very busy and responsible time.

THE MEDICAL DEFENCE UNION

Another year of useful service to the medical profession was reported at the annual meeting of the Medical Defence Union which took place at 49, Bedford Square, W.C. The membership of the Union now stands at over 22,000, and the funds available at £130,850. On the question of the position of practitioners on national and military service, the annual report points out that many medical men during war will be brought into closer professional association with members of the public, and that they should therefore maintain their membership of the Union to secure continuity of protection should charges of negligence or the like be brought against them.

In their usual summary of the cases submitted to them the solicitors to the Union (Messrs. Hempsons) draw attention to two cases of special interest. In one of these a patient, badly hurt in a motor accident but not unconscious, was attended by a general practitioner and approved his calling in a surgeon. Before the treatment could be given, however, the surgeon's retainer was somewhat abruptly determined in favour of another surgeon, and liability was repudiated on the ground that in calling in the first surgeon the practitioner had acted on his own initiative and without authority. In the county court it was word against word, and the judge accepted the patient's denial and dismissed the claim. It appears that a general practitioner has no implied authority to pledge the patient's credit to the extent of consultant's fees save in very exceptional circumstances.

The Missing Swab

The other matter was a "missing swab" case, and the Union has gained a point towards establishing the view that a surgeon is not liable for the omission to remove all swabs that have been inserted during an abdominal operation, provided he is satisfied that a reasonable system of checking and counting swabs is in use at the hospital or nursing home, that the nurses and others assisting are fully qualified, and he has been assured that all swabs are accounted for. In this case in which a swab had been left in a special jury gave a verdict against the surgeon, but the Union appealed to the Court of Appeal, who overruled the jury's findings and ordered a new trial, of which order, however, the plaintiffs have not taken advantage. It cannot be said, of course, that this is a verdict in favour of the surgeon; it is tantamount to "not proven," but the solicitors say that there are two very important matters inherent in the decision. In the first place it makes it clear that the case of James *v.* Dunlop (1931) is not an authority for the principle that the surgeon is *ipso facto* liable for a miscount, but that all that case decided was that on the particular facts there was negligence. Secondly, the decision means that the principle of *res ipsa loquitur* (that the facts speak for themselves) has no application to a case of this kind. It was held by the majority of the Court of Appeal that in such a matter it was the duty of the plaintiff alleging negligence to prove it, and that it would not be safe to beg the question of proof by suggesting that certain things could not happen without negligence.

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PROGNOSIS IN TOXAEMIAS OF PREGNANCY

In the not very distant past it was commonly supposed that women who survived eclampsia and its immediate risks made a quick recovery and could later undergo further pregnancy without fear of renewed danger. There is now abundant evidence to show that this view is incorrect; a considerable proportion of these women are permanently crippled in health, and there is a ten to twenty times greater liability to a recurrence of the eclampsia in subsequent pregnancy. The exact nature of the residual disease has been the subject of much discussion, but it has been generally assumed to be a chronic nephritis, occult or revealed, resulting from glomerular damage. In a recent paper read before the British Congress of Obstetrics and Gynaecology Professor F. J. Browne and Miss G. H. Dodds[1] presented results of a comprehensive study of the after-histories of 400 patients who had been under treatment for pregnancy toxaemia in University College Hospital since the inception of the obstetrical unit twelve years ago. Most of these patients had been repeatedly examined over a period of many years. This valuable paper throws much light on the question of prognosis, and while certain previous beliefs are confirmed others are clearly disproved.

The chief facts brought to light by the analysis are the findings that continued hypertension was present in a large proportion of the patients in the eclamptic and pre-eclamptic groups, and that chronic nephritis of the type characterized by albuminuria, high blood urea, or impaired kidney tests was not present in any case. This latter observation in particular is at variance with current teaching, although several recent writers have prepared us for this view. Thus, Theobald in 1933 stated that the Registrar-General's returns did not show any significant difference in the death rate from Bright's disease between married and unmarried women, or even between women and men. In considering this question it must be remembered that chronic cardiovascular change is intimately bound up with the function and pathology of the kidney, and it may therefore be fair to say that current teaching is more at fault with regard to its definition of nephritis than to its basic meaning. Be that as it may, it is safe to say that chronic glomerulo-nephritis can no longer be regarded as a sequel of toxaemia of pregnancy.

Hypertension (defined as a blood pressure in excess of 130/75) was present in 60 per cent. of eclamptic and in 50 per cent. of pre-eclamptic patients. There is therefore no support for the prevalent belief that eclampsia carries a less dangerous remote prognosis than does a continued pre-eclamptic toxaemia. To some it may seem that the standard for defining hypertension is set too high. If, however, a modified standard of 140/90 is used, 30 per cent. of patients in the eclamptic group still register an excessive blood pressure. Browne and Dodds believe that in these patients there is a familial tendency to hypertension, and that pregnancy merely hastens its onset. It would be interesting to know the incidence of hypertension in a comparable group of healthy non-parous women of similar ages drawn from a same area; possibly such an analysis will later be forthcoming. Another important observation is the fact that albuminuria may linger after pre-eclamptic toxaemia for twelve or even fourteen months before it permanently disappears. In spite of this the kidney behaviour as revealed by functional tests is apparently normal. This delayed healing has in the past been mistaken for evidence of glomerulo-nephritis; the necessity for a prolonged observation is thus emphasized.

Patients showing recurrent toxaemia in succeeding pregnancies were in most cases found to have hypertension continuing between the pregnancies. Sixty-five patients known to have hypertension before pregnancy, or at least before the twentieth week of pregnancy, and in whom no other sign or symptom of disease could be detected, were followed through a total of eighty-five pregnancies. In this group 9.2 per cent. died within the twelve months under review. In spite of this high death rate it is stated that pregnancy does not appear to have an obviously detrimental effect, and the high death rate is to be explained by the assumption that the expectation of life in this group is already very poor. True chronic nephritis of the glomerular type complicating pregnancy was found in only seventeen women. It is interesting to know that nine of these patients passed through pregnancy without any obvious aggravation of the original chronic nephritis. On the other hand, five patients in this group died in the period under review; the opinion generally held regarding the gravity of this condition is thus confirmed. A blood urea level of over 40 mg. per cent., the presence of albuminuric retinitis, or increasing albumin in the urine are danger signals which urgently call for termination of pregnancy.

This investigation illustrates the value of clinical observation patiently continued over a long period of years. It is doubtful whether such work would be possible except in a special department staffed by

[1] *J. Obstet. Gynaec. Brit. Emp.*, June, 1939.

whole-time, or substantially whole-time, workers. At a time when university policy regarding the establishment of "clinical units" is being subjected in certain quarters to adverse criticism, this publication comes as a striking example of the valuable research which is now being fostered by the system. We look forward with interest to further contributions regarding pathological and biochemical studies which have been made concurrently with the present clinical investigation of pregnancy toxaemia.

SOCIAL HYGIENE IN WAR TIME

The British Social Hygiene Council, which was originally known as the National Council for Combating Venereal Diseases, came into existence twenty-five years ago as a result of what we may presently cease to call the "great war." Naturally, therefore, it has felt an increased sense of responsibility in view of emergency conditions, the increase in the armed forces, and the feeling of general insecurity, all of which bring their own psychological dangers. During the war of 1914–18 it is estimated that about 400,000 men of the British forces were treated for venereal disease, which meant their withdrawal from military service for an average of five or six weeks, while the damaging effect on the civilian population and the children was apparent during later years. The incidence of venereal diseases among the civil population is thought to be lower now than it was in 1914, though there are no figures available for the earlier year because no free treatment centres had then been established, and it would not be relevant to take the immediate post-war period, when conditions were quite abnormal. The twenty-fourth annual report of the council (published in the latter part of July) calls attention to the number of militiamen under training, the doubling of the strength of the Territorial Army, the recall of a number of Army reservists, and the expansion of personnel in the Navy and Air Force. During the present year, before the crisis had ripened into war, 700,000 young men were or had been in camp and depot, with their necessary removal for shorter or longer periods from normal conditions of employment and family life.

The council holds that it is essential that education on the place of sex in life and guidance in sex behaviour should be given to all young men while under discipline. Medical instruction on the dangers of venereal disease is provided by the military authorities, but some more positive preventive measures are considered necessary. The incidence of both syphilis and gonorrhoea in the defence forces fell steadily in recent years. In 1921 in the Army the admissions to hospital for all forms of venereal disease were 74 per 1,000 strength; in 1931 this figure had fallen to 32, and in 1936 to 27.3. In the Navy there has been a fall from 113 per 1,000 strength in 1921 to 69 in 1931 and 57 in 1936; while the Air Force showed an admission rate of 36 per 1,000 in 1921, which had fallen to 14 in 1931 and 9 in 1936. Nevertheless there are a definite number of new cases, and the question which arises is where the women and girls who were the partners of these infected men obtain treatment, if they obtain it at all. A perplexing element in the situation is the discrepancy between the number of men and of women who have sought treatment for gonorrhoea at the centres—nearly four men to one woman—which suggests, after allowing for other factors accounting for sex difference, that there are probably a large number of women in the community suffering from gonorrhoea in various stages without ever seeking treatment. In centres such as Edinburgh, where an adequate social service is attached to the treatment centre, and where close co-ordination exists between the various medical services of the municipality, the numbers of men and of women are almost equal. From a questionary issued to medical officers in charge of 186 treatment centres in England and Wales a year ago it appeared that there were only three whole-time and twelve part-time venereal diseases almoners. In one county (Staffordshire) a detailed inquiry was undertaken. In the two county borough centres the cases of recent infection for gonorrhoea numbered 267 males and 100 females, and only 125 contacts had been brought under medical care at the centres, the untraced contacts numbering 242. Neither centre had a trained almoner or social service worker. In another group of ninety-four county patients, partners or wives were traced in only twelve cases, leaving eighty-two untraced contacts. An obvious stumbling-block in the way of the almoner making inquiries as to contacts is the risk which he or she runs of an action under the law of libel, and in a conference with naval authorities at one of the major ports it was found that this was a real deterrent to such social service in connexion with the centres. It is felt that communications between medical men and their official representatives, the almoners, should be regarded as privileged, but it will need either an amendment of the law or a test case before that can be established.

The revival of D.O.R.A. has also concerned the council, which is anxious to prevent a renewal of the difficulties that developed during the last war through the introduction of powers under that Act which were at variance with both public opinion and the voluntary treatment scheme. A suggestion has been forwarded to the Government with regard to the kind of section which might be embodied in emergency regulations without arousing the controversy which followed the introduction of 40 D in the original D.O.R.A. This concerns persons who are in an infectious condition, refuse treatment, and expose others to risk, and who it is felt should be placed under suitable control with facilities for treatment on modern lines.

SALUTE TO HARVEY CUSHING

The death last Saturday of Harvey Cushing removes a great surgeon and humanist. For many years British surgery has acknowledged his fertilizing mind and pen, and there are few if any surgical clinics concerned with operations on the brain that have not been inspired by his pioneer work. In America he is rightly looked upon as one of the greatest figures that the United States has produced in medicine—the man who created a new field of surgery and established a school whose ideals and methods have influenced surgeons everywhere. Harvey Cushing had pupils and admirers throughout the civilized world: universities, colleges, and learned societies delighted to honour him. In no country was he held in higher regard and esteem than in Great Britain, where every neurological clinic recognized him as the leader of intracranial surgery. His influence and achievements are part of the history of modern medicine. It was well said of him six months ago: "Harvey Cushing has flown higher and sustained his flight more consistently than any of his medical contemporaries." With regard to his pioneer studies of pituitary tumours we read: "He held the key to endocrinology. . . . The story of the pituitary is not yet complete, but the work of Harvey Cushing has accelerated progress in one of those inspired bursts of speed that characterize great epochs in the history of disease."

RESIGNATION OF SIR FREDERICK MENZIES

Widespread regret will be felt at the announcement that Sir Frederick Menzies has resigned his position as medical officer of health and school medical officer to the London County Council. The regret will be accentuated by the fact that the retirement has come about at his own request, a year earlier than it would have fallen due under the age limit, owing to the virtual disappearance for the duration of the war of the L.C.C. public health department and the hospital services as a unit organization. In seeing his work dispersed and his plans for the future indefinitely postponed Sir Frederick Menzies shares the distressing experience of many others who have to do with public health and hospitals at the present time. The exigencies of the war have uprooted in a day what it took many careful years to plan. But the London County Council service had been built up to an efficiency which made it a pattern to the whole country, and indeed to public health work everywhere. Sir Frederick Menzies has had a very full career in the public service. It would be tedious to recount all the departmental committees and voluntary bodies of which he has been a member, but mention should be made of his work on the departmental committee some ten or twelve years ago which was concerned with the training and employment of midwives, and on the more recent interdepartmental committee which has had to do with the nursing services. He was also one of the founders of the Central Council for Maternity and Child Welfare and of the Central Council for the Social Welfare of Girls and Women. He first entered the service of the London County Council thirty years ago as a part-time officer, while he was deputy medical officer of health for the borough of Stoke Newington. A year or two later he came on to the whole-time establishment of the L.C.C., and was immediately charged with some large constructive enterprises, having to do particularly with the provision of tuberculosis dispensaries, with facilities for the diagnosis and treatment of venereal diseases, and with all the undertakings which are comprehended in the term maternity and child welfare. In 1926 he succeeded the late Sir William Hamer as the head of the public health and school medical services of the Council. It was as a school doctor in 1909 that he first became associated with the Council's work. At that time the number of school children examined each year, the number treated, and the provision made for treatment facilities were almost negligible. To-day, or until the war interrupted this great social service, the number of examinations, routine or special, and of reinspections is not far short of half a million a year, and the number of children treated at the school treatment centres or elsewhere is well over 300,000. Under Sir Frederick Menzies's guidance the transfer to his Council of the duties imposed by the Local Government Act, 1929, took place with such smoothness, notwithstanding the complicated nature of the services to be transferred and the vast area and population to be covered, that hardly any of the transferred staff or the patients realized that in a night—actually on the last night of March, 1930—a great new hospital authority had come into existence. This work meant the taking over by the public health department of seventy-five hospitals, with a total accommodation of about 70,000 beds, provided for practically all classes of diseases, together with a staff of some 19,000, and in addition the whole of the Poor Law district medical work for the county and a vast ambulance organization. All the services in the sphere of medical administration, whether conducted under public health or Poor Law powers, were unified under the control of the county medical officer of health, and the immediate successful development and co-ordination of the transferred services in London was of immense value as an inspiration and model to the country as a whole. All who have come into contact with his vigorous personality and practical mind will hope that Sir Frederick Menzies in his retirement may find abundant opportunity for placing his knowledge and experience at the disposal of official and voluntary organizations. We can ill afford to lose one who was described by the public orator at the University of Edinburgh some years ago at the conferment of an honorary degree as "one of the foremost exponents of preventive medicine in this country."

OPIUM: BOON AND BANE

In *The Trail of Opium*[1] Miss Margaret Goldsmith has, in nineteen chapters, told the story of the use and abuse of opium from prehistoric times to the latest operations at Geneva under the League of Nations. The book is pleasantly written and illustrated with pictures of opium dens and smokers and some of the ingenious contrivances adopted by illicit traffickers. There is nothing of the official apologist for the Indo-Chinese opium trade in these pages, and most of the authorities referred to are those who have written critically of Governmental action or inaction. The unedifying story of the East India Company's opium policy is related, leading to the conclusion that it was conducted on the cynical principle enunciated by Warren Hastings. He declared: "Opium is not a necessary of life, but a pernicious article of luxury, which ought not to be permitted but for the purpose of foreign commerce only, and which the wisdom of the Government should carefully restrain from internal consumption." The so-called "Opium Wars" of 1839 and 1857, officially asserted to have had no connexion with opium, were then condemned by Mr. Gladstone as unjust and disgraceful. The part played by the Earl of Shaftesbury and Mr. Cobden in opposition to the Indo-Chinese trade and the invidious attitude of Sir John Bowring are referred to. The constitution and conclusions of the Royal Commission of 1894, which justified the export of Indian opium to China, partly on the financial ground that the revenue derived from it was indispensable for the efficient government of India, are criticized. Mr. John Morley, in 1906, when Secretary of State for India, admitted that that Commission had "failed to satisfy the consciences" of those who had studied the question. A new policy of concurrent reduction of production of opium in China and its export from India was initiated in 1908. The author summarizes the work of the Shanghai Commission of 1909, and of The Hague and Geneva conferences and conventions, and concurs in the conclusion of the League of Nations that the limitation of the production of opium is essential alike to the suppression of illicit traffic and to the restriction of it and its alkaloids to medical and legitimate purposes. The advocacy of this fundamental necessity for dealing with the raw materials from their source is familiar to readers of the *Journal*, which has urged the adoption of this policy for the last twenty years. Due credit is given by Miss Goldsmith to the successful work of Russell Pasha and the anti-narcotics bureau in Egypt. Attention is called to the large proportion of revenue in the Straits Settlements derived from opium sales and also in British North Borneo and Brunei. The concluding chapters show how the "six-year plan" announced by China to rid the country of opium, of which at present it is one of the largest producers, is frustrated by the policy pursued since the Japanese occupation. According to the American representative on the Advisory Committee at Geneva, huge quantities of Iranian opium have been consigned to the Japanese army and firms in North China and Shanghai. From these sources drug-shops and clinics, under Japanese and Korean protection, are supplied, and so the drug is peddled to the Chinese. According to Dr. Wellington Koo, "a new form of chemical warfare" is thus added to military invasion and bombardment. *The Trail of Opium*, while perhaps not entirely free from some anti-opium prepossession on the problem, is well worthy of study by students of social welfare who are alive to the perils of narcotic addiction.

[1] *The Trail of Opium: The Eleventh Plague.* By Margaret Goldsmith. London: Robert Hale. (12s. 6d.)

HIGH BLOOD PRESSURE

The problem of hypertension still bristles with difficulties, and the more we know about the condition the less inclined are we to dogmatism about causation. That it is by no means easy to evaluate experimental and clinical evidence in this field has been clearly noted in recent reviews.[1 2] It seems to be generally accepted that arteriosclerosis must be regarded as a secondary or coincidental change in essential hypertension, while the absence of increased cardiac output or viscosity of blood in early cases of this disorder points unmistakably to peripheral vasoconstriction of some form as the fundamental pathological disturbance. The obvious suggestion that a disorder of the blood-pressure regulating mechanisms, especially those related to the carotid sinus, might be concerned is not entirely borne out on investigation, since hypertensive patients usually show normal vasomotor reflexes from this area. These findings do not, however, entirely remove the possibility that some limitation of the efficiency of the "moderator" mechanisms may be a factor. The theory that ischaemia of the medulla may play a part is apparently negatived by the normal functioning of the respiratory centres in patients with hypertension, and it seems clear that attention must be focused on nervous and humoral factors affecting the peripheral vasomotor endings of the autonomic nerves. Pickering pins his faith on chemical factors, mainly as a result of experiments on the blood flow through the hypertensive hand, which shows no abnormal increase when nervous influences are removed by raising the temperature, and he concludes that chemical forces are at work at the periphery. It must be admitted that it is apparently easy to produce pressor bodies by experimental ischaemia of the kidney. On the other hand, humoral agents have not yet been practically demonstrated in actual cases of hypertension, and it appears that the blood pressure of normal individuals does not rise when they are transfused with large volumes of blood from patients with hypertension. Such obstacles to a clear-cut case may have encouraged other observers to look more closely at the constitutional and psychological characteristics of the patient with high blood pressure. The difficulty of obtaining patients for investigation before the clinical picture and aetiological situation are confused by late vascular disease seems to have been overcome in a number of cases of essential hypertension which have been examined by American psycho-analytic investigators. Their studies reveal that

[1] *British Medical Journal*, 1939, **1**, 1.
[2] *Psychosom. Med.*, 1939, **1**.

these patients showed as common characteristics external poise, gentleness, and amiability. But, according to these workers, this docile and unaggressive façade concealed a strong rebellion which was much more representative of their real nature. Further confirmation of these interesting observations is required. It is not improbable that emotional disturbance may be the connecting-link between the neurogenic and humoral factors in hypertension.

A MEDICAL MISSION IN CHINA

The League of Nations sent out a medical mission early in 1938 to assist the Chinese authorities to protect the civil population against epidemics, and an interesting account[1] of the work of the French contingent in the south of China has recently been given by M. A. Lasnet. He decided to follow the territorial organization already used by the Chinese medical service, and therefore sent to each of seven districts a medical officer with staff and a lorry, setting up his own headquarters in Canton. Co-operation with the Chinese local services, with the national anti-epidemic service, and with certain units of the Red Cross which were in the neighbourhood complicated the work of the mission but made it much more effective than it would have otherwise been. The laboratory was the central point and without it nothing could have been done: its task was to carry out diagnostic tests and manufacture sera and vaccines. The three chief diseases which had to be dealt with were small-pox, cholera, and malaria. Small-pox is endemic over the whole of South China, especially in the Kwangsi districts. In spite of the initial difficulties, the mission performed in the course of a few weeks 1,200,000 vaccinations. Cholera is a summer epidemic, and constituted a very serious problem. A large staff was occupied in investigating, isolating, and treating the patients, disinfecting water supplies, inspecting markets, and other duties. A million and a half vaccinations were performed. The campaign against malaria had to be restricted to the distribution of quinine, as only a long-term engineering policy would free those marshy plains from the parasite. The mission took out over 1,500,000 tablets, but really needed four or five tons. It also had to set up, against the tradition of centuries, a sanitary organization in Kwangsi: to build latrines, sewage tanks, and incinerators; to protect wells; to carry out education and propaganda by many different means; and to instruct the authorities in running health services. It had to do all this under intermittent bombardment by Japanese aircraft, and afterwards under threat of invasion of the country. At the time of M. Lasnet's report the mission was still active.

ARTIFICIAL LIMBS AND AMPUTATIONS

The fine work undertaken by the Ministry of Pensions in providing artificial legs and arms to the 42,000 officers and men who suffered limb amputation through service in the war of 1914–18 is well known to the medical profession. The unprecedented demand for limbs stimulated the production of improved technical devices and higher standards of material and workmanship, while the ingenuity of the technician has been guided into the desired direction by the Ministry's surgeons responsible for choosing the most suitable limb for the particular case and supervising its fitting to the stump in accordance with the surgical requirements. Limb-fitting has thus become a newly and highly developed technique in surgical practice, and the Ministry can lay claim to have become a pioneer in the development of the modern surgery of amputations and in the design and construction of all types of artificial limbs and appliances. Beyond providing limbs for pensioners it meets the requirements of the Service Departments, and recently, by arrangement with Queen Mary's (Roehampton) Hospital Committee, the facilities at that hospital and the Ministry's limb-fitting centres in the provinces have been made available for civilian patients throughout the country. Lectures and demonstrations have also been given at Roehampton to surgeons nominated by public and local authorities and civil hospitals. An account of the special knowledge and experience gained in the organization of this service for the provision of artificial limbs is given in a handbook prepared by medical officers of the Ministry of Pensions entitled *Artificial Limbs and their Relation to Amputations*, which has just been issued by H.M. Stationery Office (price 3s., post free 3s. 4d.). Its preparation was initiated by Dr. J. H. Hebb, the Director-General of Medical Services, before his present service with the Ministry of Health. The book deals with every important aspect of the subject, including the leading features of present-day principles and practice in the surgical fitting of limbs and details of specifications of various types of artificial limbs.

The Emergency Committee of the London County Council has received with regret the resignation, on health grounds, of the county medical officer of health, Sir Frederick Menzies, K.B.E., K.H.P. It is recommending the Council, at its meeting on Tuesday next, to accept the resignation with effect from November 2, and to place on record the Council's high appreciation of his services as medical officer of health for the past twenty-eight years. The Emergency Committee is also recommending the Council to appoint Dr. W. Allen Daley, the deputy medical officer of health, to succeed Sir Frederick Menzies as medical officer of health.

The Medical Research Council, at the invitation of the Ministry of Health, has formed a Therapeutic Requirements Subcommittee, which will advise the Ministry and the medical and pharmaceutical professions on matters relating to economy in the use of drugs and therapeutic substances. All communications regarding the work of the subcommittee should be addressed to Dr. C. H. Hampshire, 44, Hallam Street, London, W.1.

Lord Horder has, at the invitation of the Minister of Pensions, accepted appointment as honorary consulting physician to the Ministry.

[1] *Bull. Acad. Méd.*, Paris, 1939, **121**, 300.

WAR WOUNDS AND AIR RAID CASUALTIES

The following article is a supplement to the series of lectures on war wounds and air raid casualties printed in these columns*

CHEMICAL WARFARE AND THE DOCTOR—II

BY

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Technique of Attack by "Gas"

Service medical officers should study *Gas,* by Major-General C. H. Foulkes (1936), where a full account is given of the various methods of employing chemical warfare in the field. These include the use of drift gas from cylinders, mists and mixtures from projecters fixed electrically, Liven's drums, Stokes's motor bombs, "M" generators (thermo-generators on the smoke-candle principle, for generating clouds of the arsenic mists), sprays from aeroplanes, as well as various types of gas shell fired by the artillery.

Gas attacks on the civil population will be made from the air. Mitchener and Cowell, in their *Medical Organization in Air Raids,* 1939, quote General Golovine, who gives statistics showing that the complete overwhelming of a capital city by gas is impossible. Repeated attacks may be made by small formations of three to nine machines, or larger numbers—twenty-seven to thirty-six. As the air defence of this country becomes stronger this menace is proportionately diminishing. It is possible for gas to be sprayed by a low-flying machine or clouds to be laid at a height. The spray from the former may be seen coming from the machine and falls like rain; from the latter the mist may arrive from some distance, its presence being only appreciated from its effects.

For the success of a gas attack weather conditions must be favourable. Clear, mild, still nights, with an absence of mist or rain, afford the best chances for success, both for non-persistent and persistent gases. Heavy rain and a high wind will minimize the toxic effects. Clear sunny days cause rapid dissipation of the non-persistent gases; a raised ground temperature increases the volatilization of the persistent gases and gives rise to a high local concentration.

Counteraction of Gas Attacks

The object of any gas raids undertaken against the civil population will be to inspire panic, confusion, and terror, with such a lowering of national morale that peace will be insisted on at any price. The air menace may be averted in four ways: (1) Reliance on agreements, pacts, and action by such bodies as the League of Nations; (2) active defence, by the provision of a powerful Air Force; (3) passive defence—anti-aircraft units, batteries, searchlights, etc.; (4) air raid precautions. No. 1 needs no comment. The second and third are becoming stronger every day in this country. With regard to air raid precautions the Government's plans are gradually being perfected. But further organization and liaison between various departments, provision and training of more personnel, and repeated exercises and practice are required to render this arm of defence as efficient as the second and third.

The doctor not a member of the medical branch of the fighting forces will help in A.R.P. work. It has already been realized by the Home Office, Ministry of Health, and the British Medical Association what an important part the medical practitioner can play, whether surgeon, physician, or family doctor. He can help not only in preserving the calmness of the public, and preventing the effects of chemical warfare by correct prophylaxis, but also, by his knowledge of both first aid and treatment of gas, save life and hasten recovery.

It is essential that the whole nation be made gas-conscious. This applies not only to members of the A.R.P. services, including all medical personnel, but also to all members of the public. Refugee and evacuation camps may be attacked by gas as well as the densely packed centres of the cities. Further instruction is needed, and a stricter gas discipline, with frequent respirator practice, is urged. Details of protection by sealed rooms, protective clothing of different types, and the wearing of one of the three types of respirator are to be found in the Home Office Manuals. Dressing stations, first-aid posts, and operating theatres in vulnerable areas should not only be splinter-proofed but gas-proofed.

All doctors are advised to practise wearing an anti-gas respirator. Familiarity with the general service type will ensure the comfortable wearing of the civilian duty and civilian anti-gas types. Details may be obtained from the books, but actual frequent practice is essential. The doctor should be able to get his respirator on in ten seconds or less and wear it for at least one hour, even with spectacles on, without the eyepieces dimming or any loss of technical efficiency. One can lecture for forty minutes on the respirator alone without repeating oneself.

It is quite feasible to perform surgical operations wearing a general service respirator, even when the surgeon has to wear glasses. Wearing the haversack at the back instead of the front of the chest ensures a sufficient supply of air when wearing sterile clothing. Theatre sisters should be taught to wear either a civilian duty respirator or, better, the G.S. pattern slung at the back, in which position it will not get in the way when stooping over instruments.

Prompt diagnosis is the first essential. It must be at once ascertained whether the "casualty" has really been exposed to gas, and, secondly, if so, the nature of the gas must be determined. A record of each case should be made and preserved on the special form prepared by the Ministry of Health. Information on the following points can generally be given by the patient or a friend: (1) condition of exposure—that is, air, spray, exposure to contaminated clothing, etc.; (2) nature of the smell; (3) duration of exposure; (4) immediate effects; (5) late symptoms; (6) when did the exposure occur?

War Gases and their Effects: Group I—Lacrimators

The liquid lacrimators may be sprayed or dropped by bombs from the air. C.A.P. requires heat. The presence of one of these substances causes an immediate irritation of the sensory-nerve endings of the conjunctiva and cornea. Profuse watering of the eyes and spasm of the

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lids temporarily blind the victim. Further concentrations may cause mild respiratory discomfort. No permanent lesions are produced, and when removed from the contaminated atmosphere all symptoms disappear in one to two hours. C.A.P. may irritate and redden the skin. An account of one case was personally communicated to me by Dr. A. C. Coleman. A young lady stayed twenty minutes in a C.A.P. chamber. A few hours later she developed severe urticaria, which fortunately immediately responded to injections of adrenaline. Perfect protection is afforded by the respirator.

First Aid.—Diagnose on the immediate lacrimation and blepharospasm. Apply respirator and remove to clear atmosphere. Irrigate the eyes with warm saline (very seldom necessary). Reassure the patient; he will recover within twelve hours. Do not send him to hospital. Established cases do not require any special treatment.

Group II—Sternutators

These are the arsenic compounds, and require heat or detonation to form them into a fine mist of minute particles. This gas cloud may be almost invisible. There is a latent period and some minutes elapse before symptoms appear. Thus symptoms may arise or become worse after putting on a respirator; an untrained person tends to take off his respirator, thinking he is no longer being protected. This is in direct contrast to Group I, where symptoms are immediately relieved by putting on the respirator. The symptoms are those of severe pain in the nose and sinuses, with repeated sneezing, burning of the throat, sore eyes, aching gums, and possibly nausea or vomiting. Mental distress may be a prominent feature, and inability to think or concentrate is generally experienced. Although alarming, the symptoms generally disappear in an hour. No permanent damage is done, and these cases need not be admitted to hospital. Modern respirators contain cellulose pads to filter off the arsenic smokes.

First Aid.—Diagnose on symptoms and the history, and do not be deceived by the severity of the symptoms and the anxiety of the patient. Apply respirator; remove to clear atmosphere. Reassure the patient; recovery will occur in an hour or two. Do not send to hospital. If the pain in the sinuses is very severe, light chloroform inhalation will give relief. For a painful nose or throat 5 per cent. sodium bicarbonate solution may be used as a wash or gargle.

Group III: Vesicants

MUSTARD

Mustard is a very insidious poison. It may escape immediate detection and does not produce symptoms for some hours. Repeated exposure may lead to hypersensitivity. Lesions may result from spray from the air, splashes from bursting bombs, or slow vaporization from contaminated buildings, ground, clothing, etc. On the skin no immediate sensory effect is appreciated. The poison penetrates clothing and enters the skin deeply and quickly, producing an erythema only after some hours. Local oedema and capillary stasis follow; later the erythema deepens in colour, a pale centre appears, and a vesicle containing yellow serum is formed. This does not contain mustard. Intense itching is usually noted, and the moist parts of the body are chiefly affected. Secondary infection is liable to occur and healing is slow. The healed scars may be pigmented for a time.

Exposure to vapour only may produce extensive effects on the eyes, temporarily blinding the subject within a few hours after exposure. Contamination by droplets of splash or spray is more serious, and may lead to permanent blindness from corneal scarring. Symptoms may begin within half an hour, and soon the eyelids become painful and swollen. Intense oedema of the lids follows, together with swelling and reddening of the conjunctiva. Corneal opacities appear, the ocular conjunctiva may ulcerate, the tension is increased, and a profuse muco-purulent discharge takes place. Photophobia and spasm of the lids may be intense.

If the respirator is not put on soon enough then the nose, larynx, trachea, or lungs may be affected. Epigastric pain and vomiting may occur from the swallowed saliva. The effects, however, do not persist. Renal complications have been noted in fatal cases. Local oedema of the penis may cause retention of urine.

Mustard Vapour.—If in from twelve to twenty-four hours after exposure to a dilute mustard vapour the eyes become red, the voice is husky, and the skin erythematous a positive diagnosis may be made. Prevention consists in wearing protective clothing, applying the respirator, and washing in soap and water or rubbing in bleach ointment for one minute. First aid consists in changing all clothing, complete bathing of the body, and repeated eye lavage. This suffices for mild cases. Note that speed is essential: cleansing must be undertaken within two minutes for liquid and fifteen minutes for vapour, otherwise burns will result. The same applies to Lewisite, except that the poison is appreciated at once and the characteristic smell is always found.

Liquid Mustard.—Yellow detector disks reveal splashes of mustard as bright red spots (red for danger). If clothing is found contaminated it must be removed as soon as possible and the patient treated as mentioned above. If the eyes are contaminated warm saline irrigation must be carried out immediately and be maintained at hourly intervals. In the open, water from a water-bottle should be poured into the eyes, followed by a drop of liquid paraffin.

LEWISITE

Lewisite resembles mustard in its action, but is less insidious. It is early detected by its odour and has a shorter latent period, both in the eye and on the skin. In extensive burns acute arsenical poisoning may result. On the skin an immediate stinging sensation follows the application of liquid lewisite. Erythema occurs within thirty minutes; vesication, too, is early, and is complete within twelve hours. Clinically the effects of lewisite and mustard can now be sharply distinguished. The lewisite blister is clearly defined: it covers the whole erythematous area and is filled with a cloudy fluid containing leucocytes and arsenic. The mustard blister has a surround of erythema and is full of a clear yellow fluid, but contains no mustard. On dry clothing lewisite is less effective than mustard, and when the clothing is wet the lewisite loses much of its effectiveness owing to rapid hydrolysis. The fine spray of lewisite is even more dangerous to the eyes than that of mustard. Immediate irritant symptoms follow. In fifteen minutes an acute conjunctivitis occurs, oedema of the eyelids, pain, and photophobia rapidly supervene, and in three to nine hours the whole painful picture is produced, an effect which is only seen with mustard at the end of twenty-four hours. The ultimate prognosis is graver also.

Since the presence of lewisite is readily appreciated the respirator is usually put on early and affords protection. As in the arsenic smokes, the symptoms of irritation may appear even after the application of the respirator. In

the absence of a respirator nasopharyngitis follows, and bronchitis may be established in twenty-four hours, which may lead to bronchopneumonia and death.

TREATMENT OF VESICANTS

Skin.—So long as droplets of mustard are visible on the skin bleach ointment will lessen the severity of the burn. This is made by mixing equal weights of "supertropical" bleaching powder and white petroleum jelly. It is stable in ordinary climates. If the contamination is extensive, bleach paste is easier to apply. Bleach paste consists of one part (by volume) of "supertropical" bleaching powder mixed with two parts of water. The affected area is swabbed for several minutes until no further odour remains. Any of the following solvents may be used: petrol, methylated spirit, paraffin, etc. Care must be taken to avoid fire; the contaminated swabs, after careful handling, must be burned. Cleansing with soap and water removes the surface "gas" and will prevent burns if carried out within five minutes. The dresser should wear gloves. This method should not be attempted if erythema has begun, but swabbing should be employed. If there is a massive contamination, the application of bleach ointment is advisable. In the case of established lesions, erythema, if mild, will clear up as in sunburn, leaving a slight pigmentation and desquamation. Tannic acid jelly or solution should be useful. With vesications the aim will be to prevent secondary infection. Mustard burns should be treated on the surgical principles outlined by Mitchiner and others. Thorough cleansing—under an anaesthetic if necessary—is followed by the application of a tannic acid compress—layers of lint or gauze soaked in a 2½ per cent. solution of tannic acid, freshly made; this is left *in situ* for several weeks if desired.

Eyes.—As soon as the patient comes under medical care, and while he is being cleansed in the shower-baths, an opportunity is taken to irrigate the eyes with 2 per cent. sodium bicarbonate solution. If the eye is contaminated with liquid mustard do not wait for the onset of signs or symptoms, but continue the alkaline lavage as often and as long as possible. This treatment becomes difficult as the oedema and spasm of the lids increases. To relieve this apply 1 per cent. sterile atropine ointment twice a day (and in all cases where the cornea is damaged). Do *not* apply cocaine. Do *not* bandage the eyes—apply a light shade and instil liquid paraffin at frequent intervals. If the discharge becomes muco-purulent 2 per cent. argyrol twice a day is indicated. The treatment of corneal ulcers, with or without hypopyon, is best left to an ophthalmic expert. With vapour contamination only the prognosis is better and the patient may be immediately reassured. In mild cases irrigate every two hours with 2 per cent. sodium bicarbonate solution, instil liquid paraffin, and apply a shade or keep in a darkened room. In more severe cases treat as for liquid contamination.

The Respiratory Tract.—Rhinitis will respond to warm douches of 5 per cent. sodium bicarbonate solution. When there is laryngitis, rest the voice, keep in the fresh air, and give a paraffin spray or vapour inhalation. (Menthol, 10 grains, tinct. benzoin. 1 oz.; sig., 1 drachm to a pint of boiling water.) Some 2 per cent. of the mustard cases in the great war ended fatally. The majority of these deaths were from bronchopneumonia. To prevent this complication keep cases where the lungs are involved in special wards, warm and well ventilated. Isolate any case of secondary infection as it occurs. Menthol is useful in allaying coughing.

As pointed out in the *Medical Manual* already referred to, it is wise to send patients as soon as possible to a special convalescent centre. This will prevent the onset of "anxiety" neurosis and such conditions as functional photophobia and aphonia. Finally, doctors looking after civilian gas casualties should remember that gassing does not in itself cause a permanent state of ill-health. Undoubtedly many gassed patients will develop neurasthenia and apply for disability pensions. Properly handled, this state of affairs will not eventuate.

PROTECTIVE MEASURES

(1) There is the standard suit fully described in the Home Office manuals. None of the recent official publications, however, mentions the important work of Major Crowden of the London School of Tropical Medicine and Hygiene. Writing in the *R.A.M.C. Journal*, this officer describes a method whereby a man can continue to perform hard manual work in full protective clothing for several hours without ill effects. A light drill shirt is put on over the waterproof and kept constantly wet with cold water. The loss of heat by evaporation keeps the wearer cool. (2) Several other types of clothing exist for troops in the field. (3) For first-aid services there are the following: (*a*) rescue and first-aid parties—a heavy standard suit; (*b*) ambulance drivers—long coat, gloves, gum-boots, curtain, and respirator or eye shield; (*c*) undressers—protective apron with sleeves, gum-boots, and respirator (generally civilian duty). The methods of decontaminating clothing and buildings, etc., are fully described in the various Home Office manuals.

Group IV—Lung Irritants

These gases may be discharged from air bombs or cylinders carried on low-flying aircraft. The gas is heavier than air and is carried down wind. Immediate application of the respirator gives complete protection, but speed is essential. A single breath of phosgene may be very dangerous.

Pathological Action.—All lung irritants act on the bronchial tubes and alveoli, causing acute pulmonary oedema. A lacrimatory effect is also produced. Chloropicrin is four times and phosgene ten times more toxic than chlorine. On post-mortem examination the chief changes are pulmonary oedema with disintegration of the alveoli. The blood becomes concentrated and tends to form thrombi. Pulmonary oedema may occur within two hours of the gassing. In the first twenty-four hours the lungs are found to be full of blood and are oedematous, with patches of emphysema alternating with collapsed areas. A pleural effusion may be present. After the second day the oedema begins to disappear, but a secondary infection leads to pneumonic patches and pleurisy. The haemoglobin may rise to 140 per cent. in the blood, and is associated with pulmonary or systemic thrombosis.

Clinical Types.—Two groups may be distinguished: the acute type with violent onset, and the acute type with insidious onset. When the onset is violent phosgene in heavy concentration and chlorine and chloropicrin will cause immediate symptoms. The patient coughs, catches his breath, and complains of a pain in his chest. The breathing becomes rapid and shallow; deep breathing brings on a painful cough. Retching and vomiting occur and the patient is knocked out. With the onset of oedema the breathing becomes rapid and shallow and the patient becomes blue, with distended veins. (See *An Atlas of Gas Poisoning*, H.M. Stationery Office, 1939.) In phos-

gene poisoning this blue phase may be passed over and quick collapse follow, with a rapid pulse and symptoms of toxic shock. Here the patient may die in two to three hours after exposure. This group of acute cases may be classified into (1) mild cases—flushed face, increased respiration rate, and cough; (2) severe cases—"blue" type, with a full pulse; (3) severe cases—"grey" type, with toxic shock. Type (1) soon recover; Type (2) do well if the pulse does not rise above 100; Type (3) do badly, and death results from circulatory failure or bronchopneumonia. In the group in which onset is delayed persons exposed to phosgene go on with their duties for a few hours and then suddenly collapse with a rapidly increasing pulmonary oedema, often fatal. Sir William Horrocks described to me how this delayed action was discovered in 1915. Some young pigs were exposed to a low concentration of phosgene and appeared none the worse. Next morning, however, they were all dead.

In the early stages very few physical signs are to be found. Later the percussion note may not be impaired, but the breath sounds become feeble, especially over the back, where fine rales appear. Blue cases, which respond to oxygen, may do well, and the pulmonary oedema is also over within four or five days. Grey cases with heart failure do badly. Bronchopneumonia often supervenes. In the great war 80 per cent. of lung-irritant deaths occurred within the first twenty-four hours.

Diagnosis.—There is a distinctive smell, and the history will help. Chlorine and chloropicrin produce urgent symptoms even in low concentrations. Relief is immediate on applying the respirator. Phosgene and diphosgene, however, even though smelt, can be breathed without coughing in low but lethal concentrations. Suspect casualties should be carefully questioned and examined. If it is certain the patient has been exposed to a lung irritant he should be kept at rest for twenty-four hours and watched. If the exposure has been short and there are no symptoms, he may be discharged after a further twenty-four hours.

First aid must be begun as soon as a positive diagnosis is made. The patient must be treated as a stretcher case, be kept warm and as quiet as possible, and be put on a light diet. Make preparations for giving oxygen and performing venesection if signs of lung injury supervene (dyspnoea, tachycardia, cyanosis, frothy expectoration, and concentration of the blood).

Treatment of Established Cases.—Suspect cases must be kept at rest and observed for twenty-four hours. If no symptoms have arisen in the next twenty-four hours they may be discharged. In the acute stages the treatment consists in rest, warmth, venesection, and oxygen. If the patient is tided over the first few days the oedema will absorb and recovery is possible. Treat all lung casualties as stretcher cases and after admission to hospital keep them quiet in bed. All contaminated clothing must be removed as soon as possible. As in the treatment of wound shock, it is most important to keep the patient warm. Venesection is carried out on the appearance of cyanosis: 15 to 20 oz. (400-600 c.cm.) are withdrawn by acupuncture. It is possible that further experience may show that subsequent introduction of normal saline intravenously may be beneficial. If the cyanosis deepens and pulmonary oedema increases, oxygen is initiated. Venesection is harmful to the grey cases. Oxygen may be required to be given continuously for some days. Nurses should be instructed in the use of an oxygen tent, closed or open pattern, nasal catheter, or Haldane's mask. An average of five litres a minute will be required for each patient. In the great war it was found that no patient in whom a pink colour was obtained by the use of oxygen died from pulmonary oedema.

Expectoration may be encouraged by posture. The Tor table (Mitchiner and Cowell) provides a simple method of lowering the patient's head to allow the serous fluid to escape from the lungs. No drugs were found to be of value in the great war. If pneumonia supervenes, some of the new drugs may be tried; but no opportunity has yet arisen to test their efficiency under these conditions. In treatment of the convalescent the remarks made with regard to mustard will apply here also.

Group V—Paralysants

The diagnosis of this group presents no difficulties. *First Aid*: For both HCN and H_2S prolonged artificial respiration with administration of O_2 and CO_2 is indicated. In these cases some form of artificial respiration by apparatus, such as an "iron lung," Eve-Riley rocking stretcher, or the Tor tilter, may save life. Full details are to be found in the *Medical Manual of Chemical Warfare.*

Surgical Treatment of Gas Casualties

It will probably be found that the number of wounded and gassed cases will vary inversely—that is, there will be wounded only and no gas, or vice versa. In individual cases decisions must be made according to the circumstances. A man contaminated with mustard must be stripped and cleansed and reclothed before being admitted to the pre-operation ward and theatre. General anaesthesia may be inadvisable in the case of lung-irritant poisoning, but gas-and-oxygen preceded by menthol inhalation will probably be safe in mild cases. Operating theatres, as already noted, should be splinter-proof and gas-proof. If these precautions have not been taken the surgeon and all the members of his team should be prepared to work in respirators if necessary.

Concluding Remarks

Undoubtedly many gas casualties will arise among women and children. The children will require extra nurses, and will probably fare worse than adults. I saw infants with mustard burns in some of the villages near the line in France during the last war, but only in small numbers. They made constant demands on their mothers.

When gunpowder was introduced the men of the time said, "How terrible; cannot we go back to the humane bow and arrow?" The same has been said of chemical warfare. But with careful education, preparation, organization, discipline, and determination it will be easier to protect the people of this country against gas than against high-explosive or incendiary bombs.

A short bibliography is given below: for a very full list of authors (826) the reader is referred to Hanslian, vol. i, *Der Chemische Krieg*, 1937.

I wish to acknowledge my indebtedness especially to the most excellent *Medical Manual of Chemical Warfare*, 1939, which should be read by all doctors.

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DISPERSAL OF RADIUM IN WAR TIME

We have received from the chairman of the Emergency Measures Committee of the National Radium Commission the following preliminary memorandum on dangers of the dispersal of radium in war time, written by A. R. Greatbatch, B.Sc., of the Research Department, Woolwich.

Dangers from Aerial Bombardment

In considering special dangers from aerial bombardment particular attention must be given to the disruptive action of a high explosive bomb upon radium containers and the probable dispersion of radium dust over a wide area. The effect of such disruptive action cannot be stated in precise terms or with exact detail, as the extent of the damage will depend upon a number of factors, including the type and size of bomb, the general protection afforded by the building housing the radium, the material and design of the container, and its actual position with regard to the bomb when the explosion occurs, etc.

It is therefore necessary to examine the effect of a bomb explosion in rather general terms and apply them to the particular case of radium. For this purpose it is usual to differentiate between the blast effect and that due to the fragmentation.

Blast Effect

Blast effect is caused by the extraordinarily high speed of the explosion and the succeeding pressure wave. In the case of a 500-lb. bomb—a size which may be expected to be used by enemy aircraft—any object within a range of from 20 to 25 ft. would be subjected to extremely high stresses. Large objects, unless exceedingly strong, would be shattered and smaller objects if suitably placed may, in addition, be hurled away with a velocity approaching that of the velocity of a bullet leaving the muzzle of a rifle. Glass containers within this range would undoubtedly be completely dispersed, and unprotected metal radium needles would almost certainly be disrupted and the contents scattered. Any body or envelope surrounding a needle would afford it some protection, and it is even conceivable that a needle buried in a human torso would escape destruction under some circumstances. Generally speaking, the stronger the envelope the greater the protection, and it is considered that a reasonably large measure of protection would be given by a suitably designed steel container which, unless made of special bullet-resisting steel, would require to have walls of 3 in. thickness or more entirely surrounding the radium.

Effect of Fragmentation

The danger from fragmentation is of a different nature. Here there is a possibility that a radium container may be struck by one of the many thousand bomb fragments which are hurled by the force of the explosion at velocities reaching double or even treble that of the muzzle velocity of a bullet. The danger range may extend to over 100 ft. from the bomb, and a direct hit by a fragment within this area would shatter a container unless heavily protected in the manner already described.

The protective value of the building which houses the radium should not be overlooked nor overrated, and it should be related to the fact that modern armour-piercing bombs dropped from a height of 10,000 ft. or more are capable of penetrating through about 5 ft. of concrete or about 30 ft. of earth. Thus to attain complete protection from both blast and fragmentation from a 500-lb. H.E. armour-piercing bomb it is necessary that the radium should be covered by well over 30 ft. of earth. The recommendation of the conference that radium should be sunk to a depth of 50 ft. in the ground will therefore ensure safety from danger of radium dispersal in all circumstances, including a direct hit. Similar safety might be attained by heavy concrete buildings of the requisite thickness, but the cost would be very high.

HOARDING OF OXYGEN AND NITROUS OXIDE CYLINDERS

The Ministry of Health in a notice issued on October 7 reminds hospitals, private individuals, and industrial concerns that it is contrary to the national interest for them to hoard oxygen and nitrous oxide cylinders, whether filled or empty. While there has been a definite response to the appeal made at the beginning of September the Ministry is informed that there appears to be a renewed tendency to hold undue supplies. The adequacy of the existing supplies can only be ensured if cylinders are not held in excess of actual requirements and if they are kept in constant circulation. Empty cylinders should be returned with the minimum of delay to the suppliers by whom they were issued.

Correspondence

Radium Precautions

SIR,—Dr. Cochrane Shanks is being wise after the event. There have been no air raids, therefore all precautionary measures have been scare measures. In April a letter appeared in your columns (also in the *Lancet* and *Nature*) outlining a scheme whereby radium could be got into safe keeping as an emergency measure. Not a single dissentient voice to this scheme was publicly raised. It was put into operation, and on the eve of the declaration of war it is probably true to say that over 95 per cent. of the country's radium was safely at a depth in boreholes.

Within four days of the declaration of war we were parties to discussion as to how this radium could be got out of the boreholes and put to the service of cancer and other patients under reasonable conditions of safety. These discussions have led to the formulation of a practical scheme which has for the last week been under consideration by the Ministry of Health. Dr. Shanks strikes a false note when he holds those who have been concerned with these measures of emergency, and then with schemes of war-time treatment, as responsible for the death of cancer patients, so far denied radium treatment since September 3.

If Dr. Shanks has any real doubts about the danger of dissemination of radium under the action of high explosives, we would recommend him to read the article by Mr. Greatbatch, entitled "Dangers of the Dispersal of Radium in War Time" which you have for publication in the current issue. [See left-hand column.]

Dr. Shanks's vision of the radium service of a hospital as being carried on with the commodity all tucked away in the basement safes is rather at variance with the everyday experience of it being where it is wanted—namely, in the wards, clinics, and operating theatres.

This letter may serve a purpose if only to remind your readers that the actions taken in the first instance were persistently stated to be emergency measures, and that since the outbreak of war efforts have been, and are being, made to get radium back into use under reasonable conditions of safety.—We are, etc.,

SIDNEY RUSS,
GEORGE F. STEBBING.

London, W.1, October 9.

Organization of the Emergency Medical Services

SIR,—Professor A. W. Sheen (*Journal*, October 7, p. 741) has raised a question of great importance which should receive immediate consideration. During the last war the Military Orthopaedic Hospitals (afterwards called Special Military Surgical Hospitals) were organized under the direction of Sir Robert Jones. The principles upon which their organization was based were:

That the surgical staff consisted of orthopaedic surgeons or at least of surgeons who possessed a special aptitude for and interest in the mechanical side of their work.

That the hospitals should be fully equipped and staffed not only for the surgical and mechanical side of their work, but also for all forms of physical treatment and for rehabilitation by physical exercise, games, and occupational therapy.

That the treatment from as early a stage as possible right down to the completion of functional recovery should be carried through in one institution and under one directing head.

There can be no doubt that these hospitals had a great success. Unfortunately the principles upon which they worked were not adopted by civilian hospitals during the post-war period. But they were brought back into prominence by the British Medical Association's report upon the treatment of fractures, and the complete fracture department recommended in the reports of the Interdepartmental Committee on the Rehabilitation of Persons injured by Accident is practically an orthopaedic unit in this sense. If such units were necessary for civilian injuries, surely they are more so in war. Should we not get on with their organization and arrange for the transfer of suitable cases to them at as early a stage of treatment as possible?—I am, etc.,

London, W.1, Oct. 9. R. C. Elmslie.

Planned Psychotherapy in War Time

Sir,—Many comparisons have been drawn between the preparedness of the nation now and in 1914. Your correspondence columns bear striking testimony to one great difference: whereas in 1914 the majority of the medical profession were sceptical as to the value of psychotherapy, to-day we are discussing the best means of utilizing it for the rehabilitation of the inevitable psychological casualties. Dr. Geoffrey Evans bids us look in the first place to ourselves; and it is true that no doctor can remain a "neutral observer," so closely is the sufferer observing him. In the next place comes Dr. Telfer's plea for the establishment of local treatment centres, a practical step which some of us were hoping to see included as additional benefits under National Health Insurance before the outbreak of war altered the face of things. But we shall have to put our own house in order, remembering, as Rudyard Kipling said of the construction of tribal lays, that every single school of psychotherapy may be right in the sense that in skilled hands each of several methods may be successful. Do not let us therefore emphasize our differences too vigorously, lest Authority, puzzled by them, makes them the excuse for doing nothing at all. I have reason to believe that this is a real danger, and we are all agreed it would be a real disaster.—I am, etc.,

London, W.1, Oct. 10. W. Langdon-Brown.

Industrial Dermatitis

Sir,—The letters which have been appearing in the *Journal* since August on the above subject raise many points of practical importance. When, as in cases of workmen's compensation, medicine and the law meet for the common purpose of doing justice they necessarily approach the same point from different angles. The law must concern itself with words and the possible interpretation of them. Its definitions must be clear and precise. In medicine, whether general or special, such well-defined lines can rarely be drawn. It is therefore very desirable, as Dr. Ingram points out (September 9, p. 584), to quote the wording of the Act correctly when making any criticisms of it. "Dermatitis produced by dust or liquids" are the words that the law gives us in the way of guidance.

There is happily no definition of "dermatitis" or of "dust" or of "liquids." Indeed, the very vagueness of the wording is its strength. Occupations are so varied and the physical and chemical factors concerned are so many and so rapidly increasing in number that any attempt at a closer definition would weaken rather than strengthen the purpose of the Act. If any change is to be made in the future wording it might well be to replace the term "dermatitis" by the still more vague words "disorder of the skin" or "skin eruption." When the Act was drawn up the term "dermatitis" had no defined place in the category of diseases of the skin; to-day it has been applied, with more or less accuracy, to certain particular groups to which many skin eruptions properly recognized as of occupational origin certainly do not belong.

There is one point in Dr. Ingram's letter which I venture to think is perhaps a little too dogmatic. He says: "If a substance is suspected of causing dermatitis in an individual, then the application of that substance to the skin—in the form of a 'patch test'—will prove whether or not it is capable of producing dermatitis in that particular individual." Whilst a positive reaction may be decisive, a negative result hardly warrants the opposite conclusion. All parts of the skin are not exactly the same in their reactions to an irritant, and unless the dust is applied to the same part of the body, for the same period of time and under the same conditions as it was when at work, the comparison of its effects hardly seems justified.

Some of your correspondents suggest that if a person, known to have suffered off and on from what we used to call eczema, gets an attack while employed it is wrong that he should receive compensation for "dermatitis produced by dust or liquids." This will depend on circumstances. Such a person may be one whose skin is hypersensitive and readily flares up into a typical generalized eruption by undue exposure to dust or liquids which would have no such effect on a normal skin. In such a one this particular attack of dermatitis may rightly be said to have been produced by dust or liquid to which he has been exposed in his work.

There is one point which I think has not been alluded to in this correspondence, but on which some interesting and suggestive observations have been recorded by MacCormac in the *British Journal of Dermatology and Syphilis* (1937, **49**, 409). From time to time cases undoubtedly due to occupation occur in persons who have for years, perhaps all their working life, been exposed to identical working conditions as regards dust and liquids, yet they have never suffered from skin trouble before. This is sometimes urged by the other side as decisive against its occupational origin. Actually, however, this argument omits one important factor—namely, that the workman has never been the same age before! Like other systems of the body the skin undergoes changes in structure and composition at different periods of life. The skin of an infant is not the same as that of an adult; that of old age differs from that in the prime of life.

It is well known that in many infants who suffer severely from eczema during the early months of life the trouble disappears completely with the oncome of childhood. In common parlance (which sometimes contains more than a grain of truth), "they grow out of it"! Similarly, as age advances and degenerative changes take place in the tissues, skin troubles do arise. May it not be that the sensitivity of the skin to irritants also increases—"they grow into it"? Nor must it be forgotten that "age of tissues" does not always correspond with number of years.—I am, etc.,

Sheffield, Oct. 1. Arthur J. Hall.

Psychological Treatment Centres

Sir,—I see among various letters in the *Journal* of October 7 one headed "Psychological Treatment Centres" (p. 743). It does not yet appear to be generally known that some of the pre-war out-patient departments for this purpose have been reopened and new ones are being established in convenient institutions under a Ministry of Health scheme.

Encouragement from M.O.H.s is, of course, very desirable and I am sure will be forthcoming if the preventive aspect is kept in mind, but those who experienced anything of the worst Barcelona air raids declare that the strongest minds get shaken by high explosives, so that much of the work may turn out to be therapeutic rather than preventive, and far from quibbling about methods of psychotherapy perhaps we shall be only too glad to use "any good school."—I am, etc.,

London, N.4. R. F. Fidler.

Emergency Treatment of Burns

Sir,—I am surprised that the first serious criticism (*Journal*, October 7, p. 745) of the use of picric acid in first-aid posts should come from America. Surely most of us have seen the man who has been incapacitated for many weeks through an extensive dermatitis as the result of the application of picric acid to a small burn which might otherwise have kept him off work for a few days. In burns in children treated with picric acid toxic erythematous rashes are seen even more frequently than in adults, and in a recent series of 400 burns and scalds treated in a children's hospital I have had ample opportunity of dealing with the results of first-aid treatment with this drug.

Like Dr. R. L. Sutton, I appreciate that this method of treatment has not been advocated without careful consideration, but I would be interested to learn of the difficulties in the way of the use of tannic acid, even in relatively unskilled hands. From a fairly extensive personal experience I can fully endorse Dr. Sutton's claims for gentian-violet in hospital practice. Unfortunately, gentian-violet is not always available as a first-aid application, and it may prove unpopular among first-aid workers, whose hands and clothes will certainly become generously stained. Would it not be preferable to use tea in place of picric acid? Tea is available in all houses and in many first-aid posts! The simplest method is to make lumberjack's tea by boiling a handful of tea in a pan of water. The dressing is soaked in this strong solution when cool, and bandaged in position. Adequate cleansing and re-coagulation will of course be carried out in more appropriate surroundings. —I am, etc.,

Glasgow, Oct. 7. Wallace M. Dennison.

Physical Medicine in War Time

Sir,—The letters of Dr. W. Garton (September 16, p. 622), Mr. J. S. Kellett Smith (September 23, p. 664), and Dr. C. B. Heald (September 30, p. 699) have interested me enormously, but they are dealing with the treatment, by physical medicine, of the later results of war injuries.

During 1914 to 1919 I was stationed in Boulogne, and I started physical treatments in a small way at No. 7 Stationary (Officers) Hospital, to which I was then attached, in October, 1915. The work was so successful that, on the suggestion of General Sir Arthur Sloggett, the British Red Cross Society erected and equipped a department, attached to No. 83 General Hospital, with a large treatment room, wards for officers and other ranks, waiting rooms, consulting-rooms, etc., which was opened in June, 1917, and of which I was put in charge. Naturally the type of cases that were referred for treatment were of the milder sort—for example, myalgias (lumbagos, etc.), sciatica, and other neurites and neuralgias, synovitis (chiefly knees), sprains, strains, contusions, the paralyses, aphonias, etc., after shell-shock, and so on. A victim to any of the above is as much *hors de combat* for the time being as one with a more serious wound or illness, and it was found that if such cases were evacuated to England they were usually sent to some small hospital in the country and very little was done for them. By treating them on the spot we found that nearly 80 per cent. were made, and kept, available for military service in France. In other words, there was a genuine economy of man power.

Of course a staff of nurses trained in the administration of physical treatment and of masseurs is necessary, but these are easier to procure now than when I started the department; I had to teach all the nurses myself, but I was fortunate in securing excellent masseurs.

If the war is to go on through the winter it would be well worth considering the establishment of such a department at a base in France without delay. Should the scheme be thought worth considering I have the full reports of the work done in my department, and I should be glad to show them to the proper authorities.—I am, etc.,

Cheltenham, Oct. 2. J. Curtis Webb.

Anaesthesia in War Time

Sir,—Most anaesthetists will agree with your correspondent "G. D. G." who advocates the use of Shipways apparatus for war surgery, and a set of Boyle's bottles make a most excellent Shipway. There is one difficulty, however, in that a set of bellows for the apparatus appears to be unobtainable. I have tried for several weeks in vain to purchase the ordinary Junker bellows. Gas and oxygen, however, appear to be readily available.

I am surprised that attention has not been called to the great value of vinesthene-ether mixture used with an open mask for war surgery. The induction is quick and pleasant, and relaxation can be obtained with light anaesthesia. This appears to be an ideal method for use by students, nurses, and inexperienced anaesthetists.

Finally, I would like to make a very strong plea for the use of gas-and-air analgesia for painful dressing of war wounds. At the Wellhouse Hospital we have used gas-and-air analgesia for all painful dressings since the winter of 1933, and we are deeply impressed with its immense value. The patient is given twenty breaths of gas and air before the dressing is started and the administration is continued during the dressing. Very few patients indeed fail to obtain relief.—I am, etc.,

New Barnet, Oct. 7. John Elam.

Sir,—I have read with amazement a letter from your correspondent "G. D. G." on anaesthesia in war time in your issue of October 7. He advocates the use of chloroform and ether in military surgery and rules out all the newer anaesthetics which have so largely replaced chloroform and ether in civilian practice, greatly to the benefit of the patient. He bases his contention on experiences in the great war and would like us to put the clock back twenty years in order to conform to the practice of that period. He states that in this war we shall be operating on men in a sound physical state, which to my mind is an extraordinary description of men who are likely to be suffering from shock or haemorrhage or toxaemia, and possibly a combination of all three. I have little doubt but that much of the mortality, and particularly the morbidity, of the last war was in fact due to saturating these casualties with protoplasmic poisons such as chloroform and ether.

"G. D. G." refers to modern anaesthetic machines as contrivances. I can only say that that may be how they appear to the uninitiated. Finally, he says that without access to mortality figures one can safely say, speaking from actual experience, that deaths due solely to chloroform or ether were an unknown factor. I quite agree that without mortality figures one might safely say anything.—I am, etc.,

Portsmouth, Oct. 8. G. M. Herriott.

Sir,—May I endorse most strongly all the points made by "G. D. G." (*Journal*, October 7, p. 744). I gave many hundreds of anaesthetics in casualty clearing stations during 1916–17–18, and taught selected sisters as well. I found that using a small brazier's foot-pump for the Shipway (a football bladder made a good reservoir and stabilizer) saved much weariness and left a free hand. The administration of gas and oxygen was possible in static conditions, but fifty bottles of chloroform and ether have only the weight and bulk of one gas cylinder and therefore an immense advantage for mobile and field work.—I am, etc.,

Oct. 8. W. F. B.-S.

Infectious Diseases in War

Sir,—My object in seeking your space is because the work I have been doing in the epidemiological field during the past fifteen years leads me to believe that taking a correlative view of so-called "infectious diseases" instead of considering each to be an entity caused by a specific micro-organism affords greater guidance in preventing and combating them. I imply that so-called "infectious diseases" are acute manifestations of disease caused by microbial invaders. The manifestations of disease produced are identical

and are brought about in the same way as when the invaders are physical agents and chemical poisons; because the area in the body which is attacked and the lesion generated are determined by and are the result of the chemico-physical changes undergone by the host's first line of defence (which resides in what I call the protein particles in the plasma). Indeed, most of the signs and symptoms and the majority of the lesions produced are the direct result of the damaged or changed protein particles which develop invasive properties.

For the sake of description, microbial invaders can be divided into those which cause infections from without and from within. The former are more independent, they subject the protein particles to more profound chemico-physical changes, they circulate in the body and enter the lesions that are produced, a more perfect immunity is established against them, they cause relapses and not fresh infections, they are prevented from becoming active with greater ease, and they are better combated with chemotherapeutic than with immunological preparations. The latter reside in the large intestine, which they seldom leave, they develop in cycles, which makes them more active at certain times than at others, they cause fresh infections, they are prevented from being active with great difficulty, and their activity is better combated with immunological than with chemotherapeutic preparations. Micro-organisms which now act as invaders from without are, in my view, either retrogressive or progressive phases of parent forms, which evolved from micro-organisms that entered the intestinal canal with the food, and they began their career as harmless saprophytes. As these changes are continuous there are some micro-organisms which have not yet gained complete independence and others which are beginning to become independent. These two groups of micro-organisms unite the two divisions. The factors which keep these processes dynamic are unfavourable climate, unwholesome food, inadequate elimination of the waste products of food, insufficient air and outdoor exercise, and worry. Man has influence over all these factors with the exception of climate, and were he to use this influence properly the incidence of so-called "infectious diseases" would be reduced to a level which could never be attained with immunological preventive measures.

A so-called war-time "infectious disease," trench-fever, is the result of a number of these factors acting in unison and without necessarily the assistance of micro-organisms to so damage the host's resistance as to make the protein particles act as invaders. So-called venereal diseases are caused by micro-organisms which have completely gained (syphilis) and nearly so (gonorrhoea and soft sore) their independence. The *Vibrio cholerae* has not yet become completely independent, as it is only capable of causing an infection when the time is ripe. The *Pasteurella pestis* is completely independent, and the same may be said of the Spirilla and Spirochaetae. The Rickettsiae invade and cause disease most readily when the proteus group of micro-organisms is active in the intestinal canal. The Clostridia have gained their independence, but they do not cause a manifestation of disease until they have subjected some of the protein particles to a certain chemico-physical change which results in the production of the so-called "toxin." The toxin is a product of the invaded and not of the invader. All the other infections mentioned in your annotation of September 30 (p. 694) are interconnected and they fall into the class of infections from within, they are caused for the most part by mutative forms of the *Bacillus coli communis*, and their activity is responsible for a syndrome to which the name "influenza" can legitimately be given. Some of the causative micro-organisms are sub-phases, or retrogressive forms of the parent micro-organisms; the streptococci, for example, from Friedländer's bacillus. Others are progressive forms like Eberth's bacillus from the *Bacillus suipestifer*. Both of these types of micro-organisms are becoming independent. Friedländer's bacillus plays the greatest part in the production of the common cold and influenza. It is completing a cycle this coming winter, when a severe epidemic may be expected, in the process of which parts may be broken off from the protein particles to which the name "filterable viruses" is given. These filterable parts of the host's main resistance are most readily formed during a pandemic, the next of which may be expected in the winter 1946–7. The streptococci become most active when Friedländer's bacillus is inactive. One of the forms causes scarlet fever, and the changes the protein particles undergo as a sequel are responsible for measles. The retrogressive changes—that is, the development into so-called ultra-microscopic viruses—the protein particles may then undergo cause variola, varicella, herpes zoster, mumps, anterior poliomyelitis, and encephalitis lethargica, whereas the progressive changes, which I call "re-hydration" and "hydration," result in the production of German measles, glandular fever, and the various forms of leukaemia. The activity of the streptococci stimulates the diphtheroid bacilli to develop into the Klebs-Loeffler bacillus, with the possible production of diphtheria. The last war was fought in a non-typhoid era, which partly explains the low incidence of typhoid fever. A new era began in 1930, and as the *Bacillus suipestifer* is growing more active a higher incidence of the infection may be expected in the present conflict to whatever extent preventive inoculation is practised.

Infections from within are not spread by the passage of micro-organisms. A so-called "infectious" individual produces an environment (for want of a better word) an entrance into which by another individual can only result in the latter becoming a victim provided the micro-organism in the colon of the entrant is on the threshold of becoming pathogenic and the main defensive mechanism in the plasma of developing invasive properties. Were more known of the nature of the protein in the plasma the riddle of disease would be solved.—I am, etc.,

London, W.1, Oct. 2. J. E. R. McDonagh.

Urine Testing by Medical Boards

Sir,—I am sure many medical members of military boards would feel grateful to you for improving the present unsatisfactory arrangements (in fact, their complete absence) whereby recruits are not instructed beforehand of the necessity to enable the board to examine their urines. A large proportion of them empty their bladders just before their arrival, with obvious results. A simple reminder enclosed with the calling-up notice would go a long way to minimize what at times is a serious hindrance to the smooth working of this (at present) most important branch of medical work on a nation-wide scale. A similar suggestion was recently made from the lay side, but for an unknown reason it was not taken due notice of by the respective authority. There would thus appear to be an opportunity for a request by the appropriate medical sources.—I am, etc.,

London, W.10, Oct. 3. G. de Swiet.

Evacuation

Sir,—The outspoken remarks by Dr. I. C. Keir in your issue of October 7 (p. 745) on the need for education in "the rudiments of personal cleanliness, self-respect, and (incredible as it may seem) the use of a lavatory" should be a source of inspiration to the Board of Education and the Ministry of Health. It is well known that personal hygiene is not on the syllabus of the training colleges. It is easy to understand, therefore, why it is not in the curricula of the schools. The parents have been compulsorily educated for some three generations, and have learnt to ignore the necessity of this subject as one that should be taught, so they are unable to instruct their children. Dr. Keir has opened our eyes to the gap in our learning. May it be hoped that those who are in power will see that it is filled.—I am, etc.,

London, W.1, Oct. 7. Octavia Lewin.

"Black-out" Problems

Sir,—There is an urgent problem which calls for solution if the health of our civilian population is not to be seriously affected—the maintenance of a "black-out" which excludes light without excluding fresh air. Many people are now spending long periods in rooms inadequately ventilated. The

periods will be longer in the darker days of winter. Already one has only to travel in public vehicles and mix with one's fellows to see that a number of people are suffering from colds. What effect will present conditions have on the spread of pulmonary tuberculosis and other infectious diseases as well as on the general health? The rationing of coal, gas, and electric light will affect the problem of heating. Inadequate illumination affects eyesight. "Blacking out" is not easy, and such blacking out as can be quickly replaced (for example, at night if removed for sleep) calls for special methods. There must be many methods for meeting the problems of ventilation, heating, and eyestrain, so I write to "ventilate" the subject.—I am, etc.,

London, W.1, Oct. 6. M. E. Ormsby.

Urethrography

Sir,—Perhaps the authors responsible for the coinage of that inelegant word "urethrography" may be permitted to make a few comments on the article under this title by Mr. James Kemble in the *Journal* of September 30 (p. 683).

In our work, which was described in a monograph entitled *The Radiographic Examination of the Male Urethra*, we had neither the advantages of the modern hot cathode tube nor of the fluid type of lipiodol. Radiographic technique has made great strides since 1925. But the experience which we gained in breaking new soil may be of some value in developing the theme on modern lines. It is impossible to obtain a satisfactory radiograph of the filled prostatic urethra unless the exposure is made while the opaque fluid is actually passing along this segment at the critical moment. To accomplish this a *constant stream* must be flowing through the urethra into the bladder. The use of a glass syringe was found to give good results in some cases, but it was discarded in favour of a simple manometric method which was much more positive. By employing this technique the whole urethra, anterior and posterior, and the bladder base are shown simultaneously on one film.

The dorsal position of the patient was used in the first experiments, but was given up in favour of the ventral position. With the patient supine, unless the rectum is quite empty the base of the bladder will receive impressions which simulate those normally produced by intravesical projection of the prostate. In the prone position this source of error is eliminated. Also, as the urethra is relatively anterior, a film placed next to the pubis will give sharper definition than one under the buttocks. Injection with the patient prone is quite simple. Lastly, a film taken after evacuation of the opaque fluid from the bladder is of definite value as an index of the amount of residual urine. Urethrography has found a place in some of the leading urological textbooks in America, and it is encouraging to find evidence of renewed interest being taken in the method on this side of the Atlantic.—We are, etc.,

Paul Cave.
London, W.1, Oct. 3. G. L. S. Konstam.

Manzullo's Tellurite Test for Diphtheria

Sir,—In your issue of June 24 (p. 1291) you wrote concerning some recent Manzullo tests, "Reliance on the test would deprive one case in six of necessary immediate serum treatment and lead to the unnecessary administration of serum to nearly 50 per cent. of non-diphtheritic cases."

It seemed to be of interest to discover how the test acted in Dublin. By the kind permission and with the help of Dr. C. J. McSweeney, the medical superintendent, I applied the test to seventy-five unselected patients admitted to Cork Street Hospital with pharyngeal exudate. Forty-three patients diagnosed as diphtheria and positive on culture yielded thirty-eight positive and five negative M (Manzullo) results; eleven "clinically doubtful," confirmed by culture, yielded two negative M results; seventeen cases of follicular tonsillitis gave six positive and eleven negative M results; while four cases of Vincent's angina all showed deep blackening—that is, positive M results. Thus in fifty-four diphtheria patients seven (13 per cent.) gave a false M negative result, while among thirty-one non-diphtheria patients ten (33 per cent.) gave a false positive. These figures for Dublin agree fairly closely with those in your note.—I am, etc.,

J. G. Tynan, M.B.,
Dublin, Oct. 5. Assistant Medical Officer, Cork Street Hospital.

Medico-Legal

DRUG ADDICT'S POSE AS DOCTOR

William Arthur Young, a morphine addict, at the end of July called on a Hampstead doctor and said that his name was Alexander McLean, that he was a doctor from Canada, and that four years ago he had had a serious operation, as a result of which he was in great pain. He asked for a prescription for morphine. The doctor found scars confirming his story and prescribed for him. Next day Young returned, saying that the prescription had been ineffective, and asked for another. He appeared to have a good knowledge of the medical profession, and the doctor gave him a prescription for 5 grains. A few days later he called again, saying that he had accidentally dropped most of the tablets down the sink. He obtained a prescription for 5 grains more. Next day he borrowed 10s. As he did not return the doctor made inquiries, and when Young came back ten days later asking for another prescription he was arrested and charged with unlawfully possessing 10 grains of morphine. He had on him a syringe and five needles.

Young pleaded guilty and told the court (*Times*, August 28) that he had called on other doctors and got prescriptions for morphine. The authorities stated that he had obtained 74 grains from eight different doctors at Brighton in nine weeks, and that at other towns he had collected 1½ grains a day during May. He had had five previous convictions. He had trained as a male nurse. Mr. L. R. Dunne, the stipendiary magistrate, sentenced him to twelve months' imprisonment, saying that his only possible chance was to be placed somewhere where he could not get drugs and would receive medical attention to fortify him against the craving for them.

Universities and Colleges

UNIVERSITY OF OXFORD

A decree was approved in Congregation on October 6 permitting any member of the University during the period of the present emergency to supplicate for a degree in absence on any degree day provided he has received permission from the Vice-Chancellor and Proctors on the grounds that he was prevented from taking the degree in person by reason of military service or other such urgent cause.

UNIVERSITY OF CAMBRIDGE

For the present the University Library will be open on weekdays from 9 a.m. to 1 p.m. and again from 2.15 p.m. until 4 p.m.; on Saturdays from 9 a.m. to 1 p.m. only. During the winter months it will be necessary owing to lighting restrictions to close at 3.30 p.m.

UNIVERSITY OF ST. ANDREWS

At a graduation ceremony held on October 6 the honorary degree of LL.D. was conferred upon William Graham Campbell, M.B., C.M., L.D.S., lecturer in orthodontics in the University of St. Andrews.

ROYAL FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW

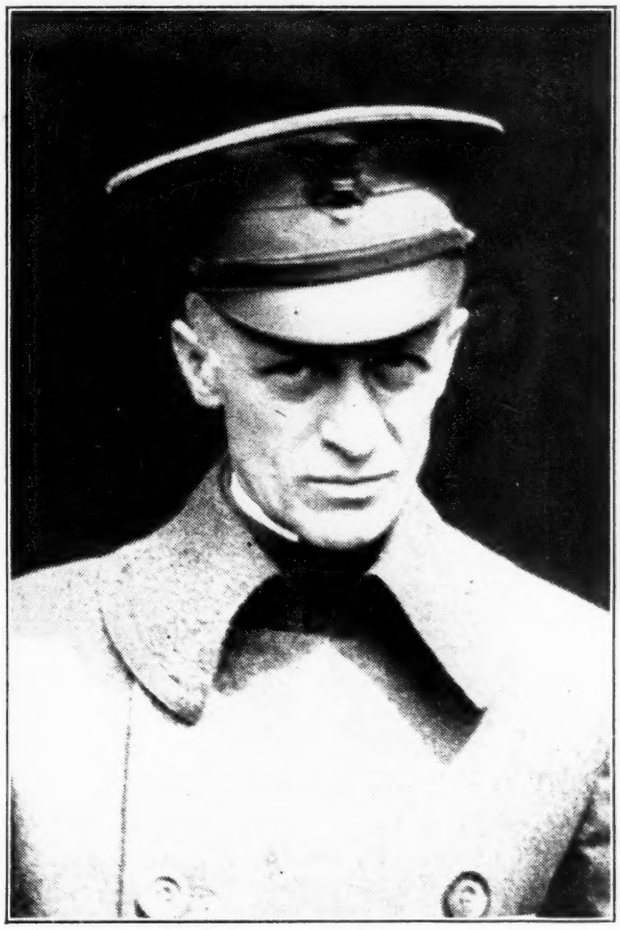
At a meeting of the Royal Faculty of Physicians and Surgeons of Glasgow held on October 2, with Dr. John Henderson, President, in the chair, the following were admitted Fellows of Faculty: Anne Cunningham Aitkenhead, M.B., Ch.B., David Clowes Williams, M.B., Ch.B.

Obituary

HARVEY CUSHING, C.B., M.D.

Hon. F.R.C.P., F.R.C.S.

We record with deep regret the death at Newhaven, Connecticut, on October 7 of Professor Harvey Cushing, the great American surgeon who was a Foreign Member of the Royal Society, a Foreign Corresponding Member of the British Medical Association, and an Honorary Fellow of the Royal College of Physicians of London and the Royal College of Surgeons of England. Harvey Williams Cushing was born on April 8, 1869, at Cleveland, Ohio; his brother E. F. Cushing (1862–1911), professor of paediatrics, his father Henry Kirke Cushing (1827–1910), professor of obstetrics and gynaecology in the Western Reserve Medical School, his grandfather Erasmus Cushing (1802–93), who came to Cleveland from Massachusetts in 1835, and his great-grandfather David Cushing, jun. (1768–1814), were medical men. His mother's family—the Williamses—migrated before 1812 from Connecticut to Ohio to create the "Yale of the West." Brought up among the traditions of the Western Reserve it was thus not unnatural that he should graduate in Arts at Yale and during his busy life return to Cleveland in reminiscent mood on ceremonial occasions, among them the dedication of the new medical buildings of the Western Reserve University (1924) and the Allen Memorial Medical Library, Cleveland (1926).



Johns Hopkins Hospital

Like W. S. Thayer, educated medically at Boston (M.D.Harvard, 1895), and a resident at the Massachusetts General Hospital, Cushing followed him to the Johns Hopkins Hospital, Baltimore. Here he probably made the final decision between the career of a physician or a surgeon; this must have been difficult for the only man except King Edward VII, when Prince of Wales, to become in later life an honorary fellow of both the Royal College of Physicians of London and the Royal College of Surgeons of England. But in an address on "The Physician and the Surgeon" (1922) he took as his text the dictum of Lanfranchi (d. 1315) that "no one can be a good physician who has no idea of surgical operations, and a surgeon is nothing if ignorant of medicine." In the Hunterian Laboratory of experimental medicine at the Johns Hopkins he worked quietly for years at experimental surgery and pathology, becoming associate in surgery in 1899 and associate professor of surgery in the University 1903–12.

Neurological Surgery

In 1905 he decided to restrict his professional activities to neurological surgery, and in that year gave an address on "the special field of neurological surgery" at Cleveland, and wrote on "comparative surgery, a new development in the teaching of operative surgery." In 1912 he was appointed Moseley Professor of Surgery in Harvard University and surgeon-in-chief to the newly opened Peter Brent Brigham Hospital, Boston, Mass., where in the next twenty years (1912–32), perhaps the most actively productive period of his life, he built up a great school of neurosurgery. For his seventieth birthday L. Eisenhardt, J. F. Fulton, and M. E. Stanton prepared his bibliography for the Cushing Society; this showed that he had written three hundred and thirty papers, addresses, and reports, and that almost exactly the same number (327) of papers had been contributed from his clinics and laboratories by his pupils. In 1912 the first of his thirteen published books appeared, the great monograph *The Pituitary Body and its Disorders: Clinical States produced by Disorders of the Hypophysis Cerebri*. This was the stimulating foundation for the widespread research work on the pituitary, and led up to his syndrome of pituitary basophilism known as Cushing's syndrome (1932). His other professional works were mainly on various forms of cerebral and intracranial tumours.

War Service

In March, 1915, Cushing left Boston for France with the Harvard Unit to serve in the American Ambulance at Neuilly, and after working there and seeing the organizations of the French and the Royal Army Medical Corps returned to Boston. In March, 1917, he took a very active part in organizing the United States Army Base Hospital No. 5, and in May sailed again as its Director for France. He became an operating surgeon with the British Expeditionary Force, and in June, 1919, was transferred to the medical headquarters of the American Expeditionary Force as senior consultant in neurosurgery. In October, 1918, he became seriously ill with acute polyneuritis, but recovered sufficiently to reach England in the middle of January, 1919, and the United States on February 20. *From a Surgeon's Journal, 1915–1918*, stated to be edited anonymously, and not published until 1936, contained his diary of his arduous war service.

Cushing's Life of Osler

Early in 1920 Lady Osler asked Cushing to write the life of Sir William. This labour of love was completed in 1925 and published by the Clarendon Press at Oxford. One of the best medical biographies and, like Sir Rickman Godlee's *Lord Lister*, by a surgeon, it gave a wonderful picture of a great personality, and was described as "the happiest fusion of the objective and subjective that biographical art has ever turned out in our rich literature" (Arnold C. Klebs). It was remarkable for the absence of Cushing's name from the text and index. It was, however, mentioned that on the day the Oslers finally left Baltimore "someone unscrewed and took away the unpretentious 'Dr. Osler' door-plate." This relic, it may be added, afterwards reposed on Cushing's writing-desk.

The first four chiefs of the Johns Hopkins Hospital—Welch, Osler, Halsted, and Kelly—greatly influenced the generation they so successfully trained up to follow the Hopkins tradition which they created. Of their pupils many became famous, and particularly Cushing, who certainly resembled Osler in personality, mentality, generosity in giving help and credit to others, in power of work and of self-effacement. Like Osler, he died a few months after his seventieth birthday had been enthusiastically celebrated by his friends and pupils. He had the same keen interest in medical bibliography, history, and book collecting. As a writer he had a clear, concise, and allusive style; for instance, at the Lister Centenary celebrations at Edinburgh in 1927 he compared Abraham Lincoln and Lister "in their service to the proposition that all men are created equal. Lister freed man from the shackles of sepsis; Lincoln, a race from those of slavery."

Cushing deservedly received many honours in Europe as well as in America; for war services C.B.(Mil.) and the Legion of Honour; a Foreign Member of the Royal Society, twenty-one doctorates from universities, and many honorary memberships of scientific and medical societies. In 1913 he was selected to give the address in surgery entitled "Realignments in Greater Medicine: their Effect upon Surgery and the Influence of Surgery upon them," at the seventeenth and last International Congress of Medicine held in London. He was then 44 years of age; the reader of the address in medicine, on "Medical Prognosis: its Methods, its Evolution, its Limitations," was Professor A. Chauffard (1855–1932) of Paris, being fourteen years his senior.

When in 1932 Cushing's time at Boston came to an end he returned to Yale as Sterling Professor of Neurology (1933–7) and consulting neurologist to the New Haven Hospital, and on account of failing health gave up the Sterling chair to become director of studies in the history of medicine.

HUMPHRY ROLLESTON.

Harvey Cushing at Home

Sir Arthur MacNalty sends the following account of "A Day with Dr. Harvey Cushing," written after his visit to the United States this year, and adds a personal tribute:

On June 26, 1939, I went by train from New York to New Haven, Connecticut, and proceeded to the New Haven Hospital, where I found Harvey Cushing working in his room. There he was, clad in a grey suit, with his clear-cut classical features like a Roman cameo, his figure as slight and upright as that of a young man, his keen eyes lit up and his face smiling a welcome to me. Papers and casebooks were on his desk, the shelves behind him were lined with books, surgeons and house-men in white coats and attentive secretaries formed his suite. With a few words of instruction he dismissed the suite and we sat down to talk. His serious illness two years ago had given his friends cause for considerable anxiety, and I was glad to find him in good health and as mentally alert as of yore. He had recently celebrated his seventieth birthday by bringing out a large book on *The Meningiomas*, in which he records the after-histories of his cases and his wealth of experience as the leading cerebral surgeon of the world to-day. He expressed his gratification at the Honorary Fellowship which the Royal College of Physicians had recently conferred upon him. "I never expected such an honour," he said with a twinkle in his eyes; "it makes me a sort of professional hermaphrodite, physician and surgeon too!"

He is now professor emeritus of Yale University and consulting neurologist to the New Haven Hospital, where he has rooms, laboratories, and full facilities for continuing his own neurological investigations and for directing and inspiring younger workers in the same field. Neither does the biographer of Osler forget his literary activities. He told me he was writing a bibliographical life of Vesalius on which he had been collecting material for forty years, the subject being originally suggested to him by Osler. After showing me his laboratories and the work on which he is engaged, Dr. Cushing introduced me to his colleague, Dr. Zimmerman, who described to me his research work on encephalitis lethargica. Dr. Cushing then took me to his delightful New England house with a wide veranda in front and approached like an English mansion by a carriage-drive. On the way we passed the Gothic grey stone buildings of Yale University set in green sward. Yale is very much the Oxford or Cambridge of the United States, and I was informed that in recent years the system of colleges has been introduced, which brings it even closer to the parent universities of England.

Dr. Cushing had invited four Yale professors, in whose work he knew I would be interested, to meet me at luncheon. These were: Dr. George Blumer, clinical professor of medicine; Dr. George H. Smith, professor of anatomy; Dr. Ira Hiscock of the public health department; Dr. Middleton C. Winternitz, professor of pathology. At luncheon we had a most interesting conversation which ranged over many subjects: Osler, Welch, the present condition of Johns Hopkins University, progress in public health in the United States, and advances in our knowledge of epidemic diseases of the central nervous system. Dr. Cushing showed me his vast library, which contains a number of rare editions of medical authors of the fourteenth, fifteenth, and sixteenth centuries. He possesses one of the most complete collections in the world of the works of Vesalius. We then left Dr. Cushing to take a siesta and the professors took me to the Medical University buildings to see something of the research work in progress there. I then returned to the New Haven Hospital and had the pleasure of a long talk with Dr. Cushing on public health work in the United States. Dr. Cushing strongly holds the view that social health legislation in the United States must be gradually built up, and that a revolutionary scheme would defeat its own objects and might antagonize the medical profession. Dr. Cushing with his wonted courtesy insisted on seeing me off by the evening train to New York.

Now those hands which wielded pen and scalpel with equal skill are at rest and the great name of Harvey Cushing passes into history. A fortnight ago I received a last gift from him, the bibliography of his writings, prepared on the occasion of his seventieth birthday by the Harvey Cushing Society. Eighty-nine pages of close print are barely sufficient to record the work which he did for the advancement of cerebral surgery, of knowledge of the endocrines, and of neurology generally. His biography of Osler is a classic, the wonderful tribute of one leader to another. As my little sketch of that pleasant day at New Haven shows, Harvey Cushing was investigating and working up to the end. It was a full and glorious life, and we who loved and admired him will ever find joy in his remembrance.

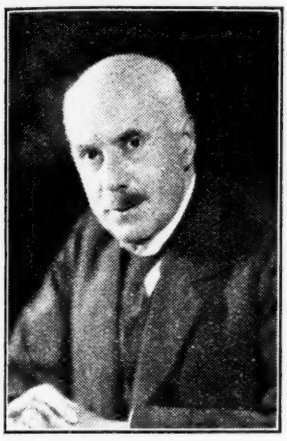
[The photograph reproduced is by the "Topical" Press Agency, Ltd.]

JOHN DIXON COMRIE, M.A., B.Sc., M.D.

Physician to the Royal Infirmary, Lecturer on the History of Medicine in the University, and Vice-President of the Royal College of Physicians, Edinburgh

We regret to announce the death of Dr. John D. Comrie, on October 2, at his home in Manor Place, Edinburgh.

John Comrie was born at Peterhead, Aberdeenshire, where his father practised, on February 23, 1875. An only child and the son and grandson of medical men, it was not unnatural that medicine should become his calling. When his father retired he came to live in Edinburgh, and it was at George Watson's College and at the University of Edinburgh that Comrie received his undergraduate training, taking degrees in Arts, Science, and Medicine, the last with first-class honours. After holding appointments as resident physician and surgeon in Edinburgh and Glasgow he spent a year in London as clinical assistant with Sir David Ferrier at the National Hospital, Queen Square, and with Mr. Marcus Gunn at Moorfields. The following winter he devoted to pathology, working in the laboratory of Professor Virchow in Berlin and that of Professor Obersteiner in Vienna. Returning to Edinburgh in 1902, Comrie engaged for a time in general practice, but for many years past he had practised as a consulting physician. Among successive appointments which he held were those of clinical tutor, assistant pathologist, and assistant physician to the Royal Infirmary. In 1927 he was appointed a full physician, and at the time of his death he was the senior physician to this institution. For a period he was pathologist to Leith Hospital, and for several years he was physician to the Deaconess Hospital, Edinburgh. From 1921 onwards he delivered a course of lectures on the practice of medicine in the School of Medicine of the Royal Colleges. In 1909 he was appointed to the newly instituted lectureship on the history of medicine, a post which he filled with distinction up to the time of his death.



A man with an essentially academic outlook, Comrie had a variety of interests and activities. He was a prolific writer, publishing among other works a book on *Diet in Health and Sickness*. In 1912 he inaugurated, as general editor, the Edinburgh Series of Medical Textbooks, and a little more than a year ago he was appointed Editor of the *Edinburgh Medical Journal*. But it is especially as a learned medical historian, for in this province he had a wide reputation, that Comrie's name will live in the annals of the Edinburgh School. Here his familiarity with the dead languages served him in good stead. *A History of Scottish Medicine*, a second edition of which appeared in two volumes, was a contribution of special importance.

Comrie was an enthusiastic Territorial. During the great war he was in charge of wards at the 2nd Scottish General Hospital; later he served in France as lieutenant-colonel of a large medical division in a general hospital; and in 1919 he accompanied the British Expeditionary Force to Northern Russia as consulting physician.

The British Medical Association had in Comrie a keen supporter. He presided over the Section of the History of Medicine at the Annual Meetings in 1927 and 1930, and for many years he had been an active worker both on the Council of the Association and on the Journal Committee. At the time of his death he was chairman of the Scottish Committee, the Scottish Central War Committee, and the Consultants and Specialists Group Committee for Scotland.

There was something very likeable about John D. Comrie. His figure was imposing, his manner unassuming, somewhat hesitating, almost prim. He had a kindly outlook and was a friendly fellow. All who knew him will recall the characteristic twinkle so often in his eye, an accompaniment of a very pawky humour. He was a *persona grata* with his colleagues not only in *res medica* but at the festive board. Dogged at times by indifferent health, the way in which he stood up to his disability and the handicap which it imposed evoked their admiration.

To his widow, the daughter of the late Mr. Archibald Hewat, and to his three daughters we offer our sympathy.

E. B.

[The photograph reproduced is by Elliott and Fry, Ltd.]

Dr. Ganesh Sawh writes: As a former President of the Edinburgh West Indian Students' Society, I wish to place on record the sincere regret that will be felt by all West Indian graduates who, during their Edinburgh career, came into contact with the late Dr. John D. Comrie. He understood the problems of students from the far-off Colonies, and was always kind and sympathetic towards them. As a lecturer in systematic medicine and a teacher of clinical medicine his fame was well known to all West Indians, and they would flock to attend his lectures and clinics. Within my knowledge no West Indian student would have considered his medical education complete had he not at some time attended the clinics of the late Dr. Comrie. He was often acclaimed by them as one of the best clinical teachers of their time. Dr. Comrie has set an example which it will be difficult for others to follow. The excellence of his teaching will, however, bear fruit in the gardens of the West Indies, where many Edinburgh graduates will reflect on the soundness of their early clinical training under a master in the art of teaching.

We regret to announce the death in his sixtieth year of Dr. Charles Michael Roberts on September 2. He was born in India and came at an early age to England, where he was brought up. Roberts received his medical education at St. Thomas's Hospital, where he obtained the first entrance scholarship in natural science. Qualifying M.B. in 1904 and B.S. in 1906, he entered the Indian Medical Service in 1907, but left it in 1908 to buy a practice in Woking. He took up *x*-ray work shortly before the last war, joining the R.A.M.C. in 1915, and was with various hospitals in France and Salonika until 1919. He became a clinical and later a chief assistant in the *x*-ray department at St. Bartholomew's Hospital, a post he eventually gave up on account of failing health. He was supervisor to the British Red Cross Society Curative Post, Woking, and was also radiologist to the Victoria Hospital, Woking. His kindly, cheery personality will be very much missed both by his colleagues in London and Woking and by those who knew him well. He leaves a widow, three sons, and a daughter.

Dr. John McFarlane William Pollard died suddenly at Cheltenham on September 26. He was a student at Guy's Hospital, and obtained the D.P.H. of the English Conjoint Board in 1912; before this he had graduated M.B., B.S.Lond. and taken the M.D. degree in tropical medicine. After serving as resident medical officer to the Central London Ophthalmic Hospital he took the certificate of the London School of Tropical Medicine and then joined the Nigerian Medical Service, of which he became assistant director. Dr. Pollard was elected a member of the British Medical Association in 1907, and was a Fellow of the Society of Tropical Medicine and Hygiene. Since his retirement from the

Nigerian Medical Service in 1928 he had held the post of honorary refractionist to the Cheltenham Eye, Ear, Nose, and Throat Hospital.

Dr. WALTER EDWARD TURNER died on September 28 in his sixty-sixth year at Eton House, Hanging Langford, near Salisbury. He studied medicine at St. Mary's Hospital, and took the M.R.C.S. and L.R.C.P. diplomas in 1900. Dr. Turner was for many years medical superintendent of the Central Middlesex County Hospital, and in 1932–3 served as chairman of the Willesden Division of the British Medical Association. He retired from his post at the Central Middlesex County Hospital on account of ill-health at the end of 1935, and was succeeded by Dr. H. Carter.

Dr. MARGARET SCORESBY-JACKSON, elder daughter of the late R. E. Scoresby-Jackson, M.D., F.R.S.Ed., died on September 29 at Worthing. She studied for the profession at the London School of Medicine for Women, at University College Hospital, and at the University of Durham College of Medicine, Newcastle-upon-Tyne, and graduated M.B., B.S. at Durham in 1924, proceeding to the M.D. two years later. She had been clinical assistant in the out-patient department at the Bethlem Royal Hospital, with care of mental defective patients, and clinical assistant in the neurological department at Guy's Hospital, and contributed to the *Journal of Mental Science* in 1927 a paper on the fragility of the red blood cells in mental disease. Dr. Scoresby-Jackson was a member of the British Medical Association and the Medical Women's Federation, and a Fellow of the Royal Society of Medicine.

Dr. FRANCIS JOHN RUSSELL died at his home in Lee Road, Blackheath, on September 30. A student of the London Hospital he qualified M.R.C.S., L.R.C.P. in 1905, and was a member of the British Medical Association for most of his professional life. At the close of 1937 he was appointed emergency officer for making the arrangements for war-time service among the medical men of Greenwich and Deptford, and did a considerable amount of clerical and other work in this respect early last year.

Dr. JOHN ALLISON, who died suddenly on October 1, aged 76, at Kettering, Northants, had been a member of the British Medical Association for forty-seven years, and in 1899 was president of the South Midland Branch. Educated at the University of Edinburgh, he took the M.B. and C.M. degrees in 1886, and proceeded M.D. in 1895; in the following year he obtained the diploma of F.R.C.S.Ed., and in 1900 the D.P.H. of the English Conjoint Board. After graduating he served as resident surgeon at the Edinburgh Royal Infirmary, and became a Fellow of the Obstetrical Society of Edinburgh. At Kettering he held for many years the post of medical officer of health to the urban district council and honorary surgeon to the Kettering General Hospital. He held a commission in the R.A.M.C.(T.), and attained the rank of lieutenant-colonel.

The death took place on October 1 at Surbiton of Dr. GEORGE FREDERICK COOPER, formerly of Longcroft, Loughton, at the age of 78. He studied medicine at St. Thomas's Hospital, and after taking the M.R.C.S. and L.R.C.P. diplomas graduated M.B., B.S.Lond., with a gold medal, in 1884. At St. Thomas's he served as house-surgeon and resident accoucheur before making his home in Chile, where he obtained the M.D. degree at Santiago in 1886 and became medical officer to Pisagua Hospital and the Nitrate Railways, Tarapaca. Dr. Cooper joined the British Medical Association in 1885 and remained a member up to the time of his death.

The following well-known foreign medical men have died: Dr. ALBERT BRAULT, honorary physician to the Paris hospitals and member of the Académie de Médecine, aged 88; Dr. VALENTIN CANTONIEAUX, the Belgian urologist; and Dr. FRANCIS HOEFFER MCMECHAN, an anaesthetist of Cincinnati, honorary member of the Section of Anaesthetics of the Royal Society of Medicine, and editor of several journals of anaesthesia.

Medical Notes in Parliament

On October 9 Mr. Oliver Stanley presented a Bill to prevent the price of goods of such descriptions as might be specified by the Board of Trade being raised above a basic price by more than an amount referable to increases in certain specified expenses. The Bill was read a first time.

Health of the Evacuated Population

Dr. SUMMERSKILL asked on October 5 whether, in determining a suitable reception area for children in country districts, investigations were made concerning the cleanliness and safety of the local milk supply. Dr. ELLIOT replied that the primary considerations in determining the reception areas had to be those of transport and accommodation. Such consideration as was possible was given to other relevant factors, including any abnormal risks from infectious disease from food and water supplies, as ascertained from public health and other reports.

Dr. ELLIOT told Sir Waldron Smithers on October 5 that his attention had been called to the condition of evacuated children suffering from various diseases, including whooping-cough, impetigo, scarlet fever, and verminous heads. He had drawn the attention of local authorities to the matter in a circular recently issued on public health services in the reception areas. Arrangements were being made for the medical inspection in the evacuating areas of the smaller numbers of school children now being moved under the Government scheme.

In answer to Sir Charles Cayzer, Dr. ELLIOT said he had instructed evacuating local authorities before dispatching any further parties to the reception areas to carry out a medical inspection and, where necessary, the efficient treatment of all children to be included in the parties.

Mr. BUTCHER asked on October 5 whether, in order to alleviate hardship and suffering to unaccompanied children coming from evacuation areas, the Board of Education would authorize medical officers of health in reception areas to provide dental, orthopaedic, and ophthalmic treatment in cases of special need without the consent of the parents. Mr. KENNETH LINDSAY answered that as regards dental treatment the Board was advised that where there was evidence that the child had received such treatment in the past it might be assumed that the parent would agree to further treatment, but that the administration of a general anaesthetic should, if at all possible, be avoided unless the consent of the parent had been obtained. In other dental cases treatment should be limited to emergency treatment. Cases requiring immediate orthopaedic or ophthalmic treatment were likely to be rare, and except in such cases the consent of the parent should be obtained.

Dr. ELLIOT will consider whether in special circumstances, such as when a doctor certifies that it is advisable, facilities can be arranged to enable parents to visit their children in reception areas in cases of illness.

Doctors and First-aid Posts

Sir FRANCIS FREMANTLE asked Dr. Elliot on October 4 if his attention had been drawn to the absence of arrangements for the continuous medical supervision of first-aid posts and for the continued training of the first-aid parties attached to such posts; and what action he proposed to take. Dr. ELLIOT replied that arrangements were made before the outbreak of war whereby a medical officer attached to each first-aid post undertook for an annual fee to conduct the collective training of the personnel of the post under the general supervision of the medical officer of health. These arrangements were still in operation.

Sir FRANCIS FREMANTLE contended that what was now required called for an infinitely greater amount of work than in peace. He said medical officers could not attend without

further remuneration. Dr. Elliot remarked that he would later in the week receive some doctors who took part in the organization of first-aid posts.

Doctors released from E.M.S.

Sir Francis Fremantle inquired on October 4 whether Dr. Elliot would arrange for medical practitioners now engaged for duty in hospitals wholly or partially empty to be released for civil practice with liability to immediate recall in case of need. Dr. Elliot replied that he would do so. Letters had been sent to a number of whole-time members of the Emergency Medical Service offering to release them for civil practice under certain conditions.

Increased Drug Prices

Mr. David Adams asserted on October 5 that since the outbreak of war vegetable drugs, essential oils, and medicinal chemicals had doubled and even trebled in price, and that certain of these were being withheld altogether from the market. Mr. Oliver Stanley replied that he found there had been substantial increases in the price of a number of goods of this class. Inquiries were being actively pursued, and discussions had been arranged with representatives of the wholesale and retail drug trades.

Proprietary Medicines: Postponement

On October 5 Dr. Elliot recalled that Sir John Simon announced on August 4 that it was intended to appoint a committee to examine both the control and the taxation aspects of the proprietary medicines question. Dr. Elliot said that in view of the outbreak of war the appointment of the committee had been postponed. The question of legislation must remain in abeyance.

Paying for Billeting

It was announced in Parliament last week that a proportion of the cost of billeting evacuated school children is to be recovered from parents. The average cost to the Government at present is roughly 9s. a week for each child. Parents or other persons responsible for evacuated children will be asked to pay the full charge of 9s. if they can afford to do so, but the Government recognizes that in many cases there will not be a corresponding relief to the family budget, and they have accordingly fixed a contribution of 6s. a week as the standard charge. Parents who cannot afford to pay as much as 6s. will pay a smaller amount appropriate to their means. The date on which liability to pay starts is fixed for October 28.

Excess Profits Tax and the Professions

In Committee of the House of Commons on the Finance Bill on October 5 Sir Henry Morris-Jones opened a discussion on the clause imposing an Excess Profits Tax. He said there was no reason why any individuals who got an accretion of their income during the war should escape this additional taxation.

Sir John Simon said there was attractiveness in the argument that this tax should include the professions, but if it were applied to all individuals it would be a third general tax. A person starting in the practice of a profession might find his income at the beginning was materially less than it would become in the course of years of successful practice. There was no justification for treating that man as having made excess profits.

The clause was agreed to and the committee stage was completed.

Institutional Treatment of Tuberculosis

Captain Plugge asked what arrangements were being made to continue the treatment of consumptives who had been moved from the institutions in which they were receiving treatment. Dr. Elliot replied on October 9 that any consumptive requiring institutional treatment should receive it. Accommodation was available for such treatment. He was investigating the question of releasing certain hospitals and sanatoria from the Emergency Scheme altogether.

School-leaving Age

In the House of Commons on October 9 the Education (Emergency) Bill, which has passed the House of Lords, was read a second time. Mr. Kenneth Lindsay, who moved the second reading, said that the Bill suspended the raising of the school age from 14 to 15. This would otherwise have taken effect on September 1 last under the Education Act of 1936. In all the evacuation areas and most of the neutral areas schools were still closed. In the reception areas, where the schools were working a double-shift system or some other expedient, there was very great difficulty in providing the sort of education visualized between the ages of 11 and 15 when the legislation was passed. The building operations to meet the requirements of reorganization were held up by the prior claims of the Services and supply departments, and the procedure of granting exemptions also could not possibly be worked at present. After the war the Government would review the whole position. This was a Bill for suspension, and not for repeal.

If compulsory schooling was to finish for the time being at 14, they had done what they could to counteract what was admittedly a step back by setting up a new body called the National Youth Committee, whose declared object was to safeguard the educational and recreational interests of young workers between 14 and 18. That was being done immediately, and might help to remedy some of the conditions, particularly in the evacuation areas. At one place in Surrey the whole dietary of a group of evacuated children had been planned, and included fruit and vegetables on a scale which the children had never seen before. The Department proposed to exploit this situation to the full and to make the most of this period.

The Education (Emergency) (Scotland) Bill, which postpones the raising of the school age in Scotland, was read a second time on the same date.

Milk Grants.—On October 2 Sir Reginald Dorman-Smith informed Brigadier-General Clifton Brown that the Milk Industry Act, 1939, which provided for the payment of quality premiums in respect of tuberculin tested and accredited milk and milk from attested herds, remained in force, and the premiums would accordingly continue to be paid for those categories of milk by the Milk Marketing Board. The premiums were independent of the bonus payable under the Tuberculosis (Attested Herds) Scheme.

Medical Attention for Dependants of Men on Service.—On October 3 Dr. Elliot told Mr. Dobbie that medical assistance was available at the cost of Service funds for the wives and families of regular soldiers and certain classes of reservists if they were living at or near a Service station. A similar privilege existed in the R.A.F. Apart from these special provisions the medical services provided for the population generally were, of course, available wherever and whenever they were required.

Dietary of School Children.—Mr. Kenneth Lindsay remarked on October 5 that there was still scope for considerable improvement in the meals provided for necessitous undernourished school children. It was not the case that the normal present diet consisted of meat, potatoes, and dried vegetables. Under normal conditions fresh fruit was recommended as an essential when planning the dietaries. Local education authorities were advised that each midday meal should include either fresh fruit or fresh vegetables. The inclusion of dishes made with cheese was also recommended.

Gas-and-oxygen for War Wounds.—On October 10 Dr. Summerskill asked the Secretary of State for War if he would advise the medical staffs of military hospitals that whenever possible they should use gas-and-oxygen analgesia in the dressing of war wounds of a severe character. Mr. Hore-Belisha replied that he was advised that the medical staff of military hospitals were fully aware of the value of this treatment, and would use it in all appropriate cases.

Inspection of Factories in War Time.—Sir John Anderson said on October 5 that the work of the factory inspectors

generally was necessarily abnormal in many respects at the present time, though still closely related to their normal function of watching and advising on the safety, health, and welfare of factory employees. Arrangements were made early in the year for the inspectorate to devote much of their time to assist in the launching of the provisions of the Civil Defence Act as to air raid shelter in factories. It was hoped that this work would shortly be completed. The strength of the inspectorate was being kept under review, and some additional appointments were being made.

Notes in Brief

Through the Swiss Minister in London the German Government has given an assurance that it will abide by the Geneva Protocol of 1925 prohibiting the use of gas and bacteriological methods of war provided that the British Government will also observe the Protocol.

No special provision has been made to attach to the staff of the Ministry of Information persons connected with the medical press. The Minister of Health will be responsible for all publicity necessitated by the work of his Department.

Medical News

As from Monday, October 16, 1939, the Library of the British Medical Association will be open from 9.0 a.m. to 5.0 p.m. (1.0 p.m. Saturday) until further notice.

The Governing Body of the British Postgraduate School at Hammersmith has decided to carry on postgraduate instruction for the present.

The West End Hospital for Nervous Diseases, at its outpatient department (73, Welbeck Street, W.), continues to provide daily clinics at 2 p.m. (Saturdays excepted). The in-patient department (Regent's Park) has been reopened to 50 per cent. of its normal peace-time capacity.

Professor Hartmann, the president, has decided that the Academy of Medicine of Paris will meet every fortnight during the war.

The Medical Benevolent Society for the East and North Ridings of the County of York (including the City of York) held its thirty-first annual meeting on September 27 at the rooms of the York Medical Society. The reports of the honorary treasurer and the honorary secretary were adopted, and the grants sanctioned in previous years were again agreed upon, and in one case increased. Votes of thanks were passed to Dr. C. H. Milburn, the retiring president; to Dr. C. Howard Jackman, the retiring honorary secretary; and to Mr. Herbert Locking, F.C.A. New members were elected and the following officers appointed: president, Mr. B. G. Sandys Belas, Middlesbrough; president-elect, Dr. F. C. Eve, Hull; vice-president, Dr. G. F. Longbottom, Middlesbrough; honorary treasurer, Dr. D. Matheson Mackay, Hull; honorary secretary, Dr. W. W. A. Kelly, York; honorary assistant secretary, Dr. J. D. Burrows, York.

The annual dinner of the West Riding of Yorkshire Edinburgh Graduates Association will not be held this year owing to the war.

The issue for September 23–30 of *Paris Médical*, which is now appearing fortnightly instead of weekly, is devoted to pharmacology, and contains a review of pharmacology in 1939 by Professor M. Tiffeneau.

Poliomyelitis at the present time is on the decline in Sweden: 3,000 cases were notified in 1936, 1,931 in 1937, 1,450 in 1938, and only 69 in the first quarter of 1939, as compared with 155 for the same period of 1938. The disease is more prevalent in the country than in the towns. The age distribution has changed. In 1936 the group most affected was not from 0–5 but from 10–15.

The Bradford Hospital and Convalescent Fund has been compelled to suspend its many winter activities for the time being. Nearly all the usual committee meetings have been postponed, but members are devoting their energies to gaining financial support for the contributory scheme in view of the probable drying up of many sources of ordinary income. The executive committee at its last meeting decided that dependants of contributors who have joined the Royal Navy, the Army, or the R.A.F. should have all the privileges of the scheme without payment of contributions for six months after the contributor's enlistment. After six months those dependants who wish to continue membership may enrol at any depot in the city without observing the usual three months' waiting period.

EPIDEMIOLOGICAL NOTES

Infectious Diseases and Evacuation

Incidence of Infection.—The effect upon the incidence and distribution of the acute infectious diseases of the evacuation of susceptible subjects from densely populated areas to rural districts is becoming more evident as the weeks pass. Little can be said with certainty at this stage on total incidence, as the observed increases in respect of the two principal notifiable diseases—diphtheria and scarlet fever—are no higher than might be expected when schools reopen and the winter months approach. Nor should too much importance be attached to the low incidence of these diseases compared with 1938, since differences as great between consecutive years are by no means uncommon.

The figures for large towns such as London, Manchester, Birmingham, and Liverpool for the week under review show that the principal epidemic diseases have fallen to approximately a quarter of their expected level, presumably on account of the evacuation.

Certain diseases such as enteric and cerebrospinal fevers, in which the attack rate among adults is relatively high, have not undergone any great change; but we may observe that the notifications of enteric for the past four weeks have been 77, 77, 77, and 71; the figures for the corresponding weeks last year were 32, 36, 45, and 27. The rates for puerperal pyrexia in the large towns have also fallen, but not equally, perhaps because of the varying success of particular evacuation schemes.

Susceptibles in Reception Areas.—Mass evacuation has brought in its train problems with which public health authorities in reception areas are only now being faced. Avoidance of spread of infection among the relatively susceptible subjects in rural areas has been sought by providing separate schools or by staggering the hours of school attendance, but there is a limit to the application of these measures, especially with the coming of winter. More success may be anticipated from an intensive immunization campaign, chiefly against diphtheria and to a lesser extent against scarlet fever and whooping-cough. The experience of South Shields may be cited in this connexion. In 1938 there were 598 cases of diphtheria, more than the total for the preceding ten years, with 61 deaths, while in the first nine months of 1939, when immunization was adopted, deaths have fallen to 32 and cases to 409, a large proportion of which were carriers. Among 13,000 children adequately immunized cases have been few and mild and no deaths have been recorded.

Problems of Isolation.—The insufficiency of isolation accommodation in reception areas has afforded opportunities of assessing the merits of home nursing of cases of infectious diseases. The absence of ordinary hygiene and cleanliness in many groups of evacuees, among whom impetigo, scabies, and pediculosis have been rife, has necessitated the provision of additional isolation accommodation in many districts. Local authorities are naturally averse to extensive financial commitments, as the duration and intensity of evacuation remain uncertain.

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INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended September 23, 1939.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for : *(a)* England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for : (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases ; a blank space denotes disease not notifiable or no return available.

Disease	1939					1938 (Corresponding Week)				
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	10	1	10	—	—	18	—	12	—	1
Deaths		—	1				1	1		
Diphtheria	889	30	163	51	21	1,198	152	201	56	25
Deaths	18	—	4	3	3	23	4	4	2	—
Dysentery	22	1	23	—	—	27	2	30	—	—
Deaths			—	—	—			—	—	—
Encephalitis lethargica, acute	6	1	2		—	2	—	—		—
Deaths		2	—				1	1		
Enteric (typhoid and paratyphoid) fever	71	6	9	11	2	27	2	3	7	1
Deaths	1	1	—	—	—	—	—	—	—	—
Erysipelas			66	4	4			72	2	6
Deaths		—	—				—			
Infective enteritis or diarrhoea under 2 years										
Deaths	54	4	23	14	9	41	10	10	7	7
Measles			6		1			18		—
Deaths	—	—	—	—	—	2	1	—	—	—
Ophthalmia neonatorum	63	2	16		—	88	4	16		4
Deaths										
Pneumonia, influenzal*	300	12	2		4	540	42	1		—
Deaths (from influenza)	4	1	2	—	—	23	3	2	—	—
Pneumonia, primary			78	3				134	10	
Deaths		1		1	3		7		7	6
Polio-encephalitis, acute	2	1				3	—			
Deaths		—					—			
Poliomyelitis, acute	38	2	3	—	—	60	3	10	—	—
Deaths		—	—				—	—		
Puerperal fever	3	3	12	2	—	2	2	3	3	—
Deaths		1†					—			
Puerperal pyrexia	153	3	16		1	157	21	14		1
Deaths										
Relapsing fever	1	—			—	—	—			—
Deaths										
Scarlet fever	1,146	37	242	42	78	1,768	160	373	59	73
Deaths	2	—	1	—	1	1	1	2	—	—
Small-pox	—	—	—		—	—	—	—		—
Deaths		—	—	—	—		—	—	—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths			—	—	—			—	—	—
Whooping-cough			24		3			125		9
Deaths	12	3	1	2	—	6	3	2	2	1
Deaths (0–1 year)	274	33	63	24	17	269	50	69	27	20
Infant mortality rate (per 1,000 live births)						45	41			
Deaths (excluding stillbirths)	4,002	588	549	158	125	4,057	781	552	174	134
Annual death rate (per 1,000 persons living)			11.1	10.6	11.0	10.0	9.9	11.2	11.8	11.9
Live births	6,054	901	804	328	187	6,311	1,158	847	348	235
Annual rate per 1,000 persons living			16.3	22.1	16.4	15.5	14.7	17.3	23.6	20.8
Stillbirths	270	19	30			284	44			
Rate per 1,000 total births (including stillborn)			36			43	37			

* Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland.
† Death from puerperal sepsis.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, W.C.1.

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QUERIES AND ANSWERS

Dermatological Out-patients

Dr. W. GRIFFITH writes in reply to Dr. P. Farrell's question (October 7, p. 752): St. John's Hospital for Diseases of the Skin, 5, Lisle Street, Leicester Square, which had to suspend its services for A.R.P. purposes, has now resumed its normal activities. Out-patients are seen daily at 2 p.m., except Saturdays, and the in-patient department has been reopened.

The Secretary of St. John's Hospital informs us that the out-patient department is open daily from Mondays to Fridays at 1.30 to 3.30 p.m., and that patients who can afford to do so are expected to contribute towards their consultation, treatment, etc., according to their means.

Income Tax

Appointment—Board and Lodging

"C. H." asks what is the basis of liability in the case of an appointment "at so much per year plus emoluments—for example, board or part board with rooms and other perquisites . . . not payable in cash."

*** Emoluments not receivable in cash are not liable to assessment unless they are capable of being converted into cash—as, for instance, in the case of a free residence which the employee is permitted to let for a rent. This general principle was laid down many years ago in the leading case of Tennant *v.* Smith. If, however, the terms of the appointment are such that the employee is entitled to a stated salary which is subject to deductions for board, lodging, etc., then the whole salary—and not that amount less the deductions—is assessable to tax.

LETTERS, NOTES, ETC.

Hallucinations

Dr. DORIS ODLUM (London, W.1) writes: The articles on hallucinations by Dr. P. K. McCowan and Dr. Macdonald Critchley in your issue of September 23 recalled two hallucinatory experiences that occurred to me some years ago. I have never met anyone who has had a similar experience, so I assume it to be unusual. At the age of 16 I went to hear Elgar's *Apostles* performed at the Three Choirs Festival at Worcester Cathedral. It was a very exciting experience, and I was in a somewhat "exaltée" emotional state after it. That night I heard the whole oratorio over again in a kind of twilight state which was not like a normal sleep. The reproduction was absolutely accurate—orchestral, solo, and chorus parts were exactly as they were performed the morning previously. About two years later I had a similar experience after my first visit to the opera in Paris to hear *Tannhäuser*. The whole opera passed through my mind exactly as I had heard it that evening. On waking I could not recall anything but one or two of the leading themes. I am fond of music but not especially musical, and usually only recall a few phrases of anything I hear. I should be interested to know if others have experienced or heard of a similar phenomenon.

Evacuated Children

Dr. ARTHUR PAIN (Thorney, Peterborough) writes: I should like to draw your attention to a matter concerning evacuated children. We are going to be paid for the extra work that these children entail. We have over 200 children in our village. At least thirty of them are suffering from impetigo; this means a huge amount of work for our district nurse, and they are seeking her advice on many matters. Our nursing association only just pays its way, and is not in a position to give extra remuneration. I think that some means should be found to give these nurses some additional remuneration for the extra and useful work they are doing.

Dangerous Drugs in the United Kingdom

The annual report to the League of Nations of Great Britain and Northern Ireland for the year 1938 on traffic in opium and other dangerous drugs follows on lines which have become almost stereotyped—no new laws or regulations, no administrative changes, and no difficulties in effectuating the International Conventions of 1912 to 1931; no opium, coca, or Indian hemp are cultivated here, and the manufacture of morphine, heroin, codeine, and dionine is restricted to two firms and that of cocaine to one. The prevalence of addiction in the United Kingdom is repudiated, only 519 persons—273 women and 246 men—are known to the central office as addicts; and morphine is the drug most favoured, that of heroin being a bad second. Of the 519 addicts, 134 are reported to be medical men, five pharmacists, two dentists, and two veterinary surgeons. Prepared opium—that is, for smoking—which is widely used in the Far East and in some of our Colonies, is totally prohibited here. Nearly 12,000 ounces of British-made morphine were exported in 1938, the largest consignments being to New South Wales, Canada, South Africa, and India. There were fifty-nine prosecutions during 1938 resulting in forty convictions: twenty-three were punished by fine, sixteen by imprisonment, and one by penal servitude.

Position of War Blinded

"If war should come there will be many cases of blindness caused by hostile activities, but we have taken all steps possible to deal with the situation as it arises." These words appear in the seventieth annual report of the National Institute for the Blind, 224, Great Portland Street, London, W.1. The position of newly blinded persons—whether members of the fighting services, police, or private individuals—is far different from that which existed in 1914. Since then there has come into being an important scheme of co-ordination which has brought about an advancement probably greater than in any other branch of welfare work. To-day, any person losing his sight becomes straightway the responsibility of his local authority and all interested voluntary agencies, all of which work in close co-operation with the National Institute. Their common aim is the welfare of the sightless; and the Institute has opened its doors widely to all who can usefully co-operate to that end. Its council of eighty members represents the bulk of official and voluntary interest in our blind population. At the time of the outbreak of war this vast co-operative movement was carrying forward its humanitarian work in an ever-widening field, and the work is not to be allowed to slow down. During war the needs of the blind are greater than at any other time.

Economy of Coal Gas

Householders and others faced with new fuel problems will find useful three new publications of the British Commercial Gas Association, 1, Grosvenor Place, S.W.1. One is a "Weekly Record Card" on which can be kept a simple account of the amount of gas used each week, thus checking quarterly consumption. The card is provided with metal tabs for easy hanging up. Another card, "Don't Waste the Gas," gives fuel and food economy hints as well as instructions for meter reading. A pamphlet, "How Gas Rationing affects You" brings the Government rationing regulations down to terms easy to understand.